

OCR A-Level Chemistry A

Group 2 and the halogens

Questions only

All 14 group 2 and the halogens questions

Questions

14

Total marks

38

Time allowed

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

For marking

Q	Source	Marks	Score
1	2017 P1 Q17	12	
2	2017 P1 Q8	1	
3	2018 P1 Q6	1	
4	2019 P1 Q2	1	
5	2019 P1 Q8	1	
6	2019 P1 Q9	1	
7	2022 P1 Q1	1	

Q	Source	Marks	Score
8	2022 P1 Q21	14	
9	2023 P1 Q11	1	
10	2024 P1 Q4	1	
11	2024 P1 Q6	1	
12	2025 P1 Q14	1	
13	2020 P1 Q14	1	
14	2021 P1 Q15	1	

Total _____ / 38 Percentage _____ %

Questions from OCR past papers, 2017–2025, reproduced for revision. Practise these topics online, with instant marking:

whiteboardchemistry.com/revision/exam-questions/ocr-a-level-chemistry/?topics=group-2-and-the-halogens&len=0

Questions

Group 2 and the halogens · 14 questions · 38 marks · time allowed 51 min

Q1 · June 2017 · Paper 1 (Periodic table, elements and physical chemistry) · Q17 · [12 marks]

This question also needs Acids and redox reactions, Amount of substance, Basic concepts of organic chemistry and 2 other topics.

This question is about Group 2 and Group 17 (7).

17(a) Barium chloride can be prepared from barium hydroxide in a neutralisation reaction.

Write the equation for this reaction. State symbols are not required.

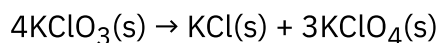
[1 mark]

17(b) The reactivity of the Group 2 elements Mg–Ba increases down the group.

Explain why.

[3 marks]

On gently heating, the compound KClO_3 reacts as shown in the equation.



This reaction is an example of disproportionation.

17(c)(i) State what is meant by disproportionation and use oxidation numbers to show that disproportionation has taken place.

[3 marks]

17(c)(ii) What is the systematic name for KClO_4 ?

[1 mark]

Two changes are described below.

For each change,

- write an equation, including state symbols,
- state and explain how the entropy changes.

17(d)(i) The reaction of aqueous barium nitrate with aqueous sodium sulfate.

[2 marks]

Full equation with state symbols

Explanation of entropy change

17(d)(ii) The change that accompanies the standard enthalpy change of atomisation of iodine.

[2 marks]

Equation with state symbols

Explanation of entropy change

Q2 • June 2017 • Paper 1 (Periodic table, elements and physical chemistry) • Q8 • [1 mark]

Four pairs of solutions are mixed.

Which pair of solutions forms a white precipitate?

Tick (✓) one box.

- ☐ **A** $\text{NH}_4\text{Cl}(\text{aq})$ and $\text{NaOH}(\text{aq})$
- ☐ **B** $\text{KBr}(\text{aq})$ and $\text{AgNO}_3(\text{aq})$
- ☐ **C** $\text{FeCl}_3(\text{aq})$ and $\text{NH}_3(\text{aq})$
- ☐ **D** $\text{Cr}_2(\text{SO}_4)_3(\text{aq})$ and $\text{BaCl}_2(\text{aq})$

Q3 • June 2018 • Paper 1 (Periodic table, elements and physical chemistry) • Q6 • [1 mark]

In the Periodic Table, element X is in Group 2 and element Y is in Group 15 (5).

What is the likely formula of an ionic compound of X and Y?

Tick (✓) one box.

- ☐ **A** X_2Y_5
- ☐ **B** X_2Y_3
- ☐ **C** X_3Y_2
- ☐ **D** X_5Y_2

Q4 · June 2019 · Paper 1 (Periodic table, elements and physical chemistry) · Q2 · [1 mark]

Which statement about the reactions of halogens with halide ions is correct?

Tick (✓) one box.

- ☐ **A** $\text{I}_2(\text{aq})$ can oxidise $\text{Br}^-(\text{aq})$.
- ☐ **B** $\text{Cl}_2(\text{aq})$ can reduce $\text{Br}^-(\text{aq})$.
- ☐ **C** $\text{Br}^-(\text{aq})$ can reduce $\text{Cl}_2(\text{aq})$.
- ☐ **D** $\text{Cl}^-(\text{aq})$ can oxidise $\text{I}_2(\text{aq})$.
-

Q5 · June 2019 · Paper 1 (Periodic table, elements and physical chemistry) · Q8 · [1 mark]

3.528 g of a Group 2 metal, M, is reacted with an excess of chlorine.

The reaction forms 9.775 g of a chloride.

What is metal M?

Tick (✓) one box.

- ☐ **A** magnesium
- ☐ **B** calcium
- ☐ **C** strontium
- ☐ **D** barium
-

Q6 · June 2019 · Paper 1 (Periodic table, elements and physical chemistry) · Q9 · [1 mark]

This question also needs Acids, bases and buffers.

Which statement is not correct for Group 2 hydroxides?

Tick (✓) one box.

- ☐ **A** $\text{Mg}(\text{OH})_2$ can be used to treat indigestion.
- ☐ **B** $\text{Ca}(\text{OH})_2$ is used in agriculture to neutralise alkaline soils.
- ☐ **C** The anion in $\text{Sr}(\text{OH})_2$ contains 10 electrons.
- ☐ **D** $\text{Ba}(\text{OH})_2$ is a product from the reaction of barium and water.

Q7 · June 2022 · Paper 1 (Periodic table, elements and physical chemistry) · Q1 · [1 mark]

An aqueous solution contains a mixture of chloride, bromide and iodide ions.

$\text{AgNO}_3(\text{aq})$ is added to this mixture, followed by an excess of dilute $\text{NH}_3(\text{aq})$.

The resulting mixture is then filtered.

Which compound(s) is/are present in the residue on the filter paper?

Tick (✓) one box.

- ☐ **A** AgCl only
- ☐ **B** AgCl and AgBr
- ☐ **C** AgBr only
- ☐ **D** AgBr and AgI

Q8 · June 2022 · Paper 1 (Periodic table, elements and physical chemistry) · Q21 · [14 marks]

This question also needs Acids, bases and buffers and Amount of substance.

This question is about the reactions of Group 2 metals and their compounds.

A student adds magnesium to dilute hydrochloric acid in one test tube.

The student adds calcium to dilute hydrochloric acid in a second test tube.

A redox reaction takes place in each test tube.

21(a)(i) Suggest **two** observations from the student's experiment that would show that calcium is more reactive than magnesium.

[1 mark]

1

2

21(a)(ii) Write half-equations for the reaction of magnesium with hydrochloric acid.

Oxidation half-equation:

Reduction half-equation:

[2 marks]

A sample of barium oxide is added to distilled water at 25 °C.

A colourless solution forms containing barium hydroxide, $\text{Ba}(\text{OH})_2$.

The solution is made up to 250.0 cm^3 with distilled water.

The pH of this solution is 13.12.

21(b)(i) Determine the mass of barium oxide that was used.

Give your answer to **3** significant figures.

mass of barium oxide = g

[5 marks]

21(b)(ii) 10 cm^3 of dilute sulfuric acid is added to 10 cm^3 of the colourless solution of $\text{Ba}(\text{OH})_2$.

Write an ionic equation, including state symbols, for the reaction.

[1 mark]

Limestone and huntite are two calcium minerals.

21(c)(i) A typical sample of limestone contains 95.0% by mass of calcium carbonate, CaCO_3 .

Fertiliser Z, $\text{Ca}_5\text{NH}_4(\text{NO}_3)_{11} \cdot 10\text{H}_2\text{O}$ ($M_r = 1080.5\text{ g mol}^{-1}$) can be made from limestone.

Calculate the mass, in g, of limestone needed to make 1.50 kg of fertiliser Z.

Give your answer to **3** significant figures.

mass of limestone = g

[3 marks]

21(c)(ii) Huntite is a carbonate mineral with the chemical formula $\text{Mg}_3\text{Ca}(\text{CO}_3)_4$.

Huntite reacts with dilute hydrochloric acid to produce bubbles of a gas and a colourless solution.

Construct the equation for the reaction. Include state symbols.

[2 marks]

Q9 · June 2023 · Paper 1 (Periodic table, elements and physical chemistry) · Q11 · [1 mark]

A student adds aqueous potassium carbonate to one test tube and aqueous silver nitrate to a second test tube.

The student adds dilute hydrochloric acid to each test tube.

Which row has the correct observations?

Tick (✓) one box.

- ☐ **A** Aqueous potassium carbonate: no change · Aqueous silver nitrate: precipitate
- ☐ **B** Aqueous potassium carbonate: no change · Aqueous silver nitrate: no change
- ☐ **C** Aqueous potassium carbonate: effervescence · Aqueous silver nitrate: no change
- ☐ **D** Aqueous potassium carbonate: effervescence · Aqueous silver nitrate: precipitate
-

Q10 · June 2024 · Paper 1 (Periodic table, elements and physical chemistry) · Q4 · [1 mark]

Which compounds of magnesium can be used as 'antacids'?

Tick (✓) one box.

- ☐ **A** Chlorides
- ☐ **B** Hydroxides
- ☐ **C** Nitrates
- ☐ **D** Sulfates
-

Q11 · June 2024 · Paper 1 (Periodic table, elements and physical chemistry) · Q6 · [1 mark]

Which equation does **not** represent a disproportionation reaction?

Tick (✓) one box.

- ☐ **A** $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HClO} + \text{HCl}$
- ☐ **B** $\text{Cl}_2 + 2\text{NaOH} \rightarrow \text{NaClO} + \text{NaCl} + \text{H}_2\text{O}$
- ☐ **C** $4\text{KClO}_3 \rightarrow \text{KCl} + 3\text{KClO}_4$
- ☐ **D** $4\text{HCl} + \text{MnO}_2 \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$

Q12 · June 2025 · Paper 1 (Periodic table, elements and physical chemistry) · Q14 · [1 mark]

Barium is in Group 2 of the periodic table.

Which statement(s) about barium is / are correct?

- 1 Its outer shell electrons are in an s-orbital.
- 2 It reacts more vigorously with water than magnesium.
- 3 It has a higher first ionisation energy than magnesium.

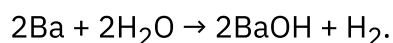
Tick (✓) one box.

- ☐ **A** 1, 2 and 3
- ☐ **B** Only 1 and 2
- ☐ **C** Only 2 and 3
- ☐ **D** Only 1

Q13 · November 2020 · Paper 1 (Periodic table, elements and physical chemistry) · Q14 · [1 mark]

Which statement(s) for Group 2 elements is/are correct?

- 1 The 2nd ionisation energy of magnesium is greater than the 2nd ionisation energy of calcium.
- 2 A strontium ion, Sr^{2+} , contains a total of 6 electrons in s orbitals.
- 3 The equation for the reaction of barium with water is:



Tick (✓) one box.

- ☐ **A** 1, 2 and 3
- ☐ **B** Only 1 and 2
- ☐ **C** Only 2 and 3
- ☐ **D** Only 1

Q14 · November 2021 · Paper 1 (Periodic table, elements and physical chemistry) · Q15 · [1 mark]

$\text{NH}_4\text{Fe}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ is a hydrated 'double salt'.

A student analyses this double salt using test tube tests.

Which row(s) gives/give correct result(s) for the stated test?

	Test	Results
1	Reaction with cold $\text{NaOH}(\text{aq})$	Green precipitate
2	Reaction with $\text{Ba}(\text{NO}_3)_2(\text{aq})$	White precipitate
3	Reaction with warm $\text{NaOH}(\text{aq})$	Red-brown precipitate and an alkaline gas

Tick (✓) one box.

- ☐ **A** 1, 2 and 3
- ☐ **B** Only 1 and 2
- ☐ **C** Only 2 and 3
- ☐ **D** Only 1

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Mark scheme:

whiteboardchemistry.com/revision/exam-questions/ocr-a-level-chemistry/pdf/group-2-and-the-halogens-mark-scheme.pdf