AQA GCSE Chemistry

Chemical changes · Higher tier

Questions only

The newest questions on the Higher papers, about an hour. All 15 are in the exam generator.

Questions	Total marks	Time allowed
5	**56**	**59 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 periodic table insert.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2024 P1H Q1 / P1F Q8	10	
2	2024 P1H Q5	10	
3	2024 P1H Q9	12	
4	2025 P1H Q6	11	
5	2025 P1H Q8	13	

Total _____ / 56 **Percentage** _____ %

Questions from AQA GCSE past papers, 2024–2025, reproduced for revision. Practise these topics online, with instant marking:
`whiteboardchemistry.com/revision/gcse-chemistry/exam-questions?topics=c4-chemical-changes&demand=standard,high&len=0`

Questions

Chemical changes · Higher tier · 5 questions · 56 marks · time allowed 59 min

Q1 · June 2024 · Paper 1 Foundation · Q8 · Paper 1 Higher · Q1 · [10 marks]

This question also needs Quantitative chemistry.

A student produced a salt by reacting copper carbonate with sulfuric acid.

This is the method used.

1. Measure 50 cm^3 of sulfuric acid into a beaker.

2. Add copper carbonate powder.

3. Stir the mixture.

4. Repeat steps 2 and 3 until copper carbonate is in excess.

5. Filter the mixture.

6. Warm the filtrate gently until crystals start to appear.

7. Leave the solution to cool and crystallise.

08.1 Complete the word equation for the reaction.

copper carbonate + sulfuric acid → _____ + _____ + carbon dioxide

[2 marks]

08.2 Give **one** observation the student could make during Step 4 which shows that the copper carbonate is in excess.

[1 mark]

08.3 Give **one** reason for filtering the mixture in Step 5.

[1 mark]

08.4 Name the equipment that can be used to warm the filtrate **gently** in Step 6.

[1 mark]

08.5 The maximum theoretical mass of the salt that could be produced using 50 cm^3 of the sulfuric acid is 12.5 g.

The percentage yield of the salt is 92.8%.

Calculate the mass of salt actually produced.

Use the equation:

$$\% \text{ yield} = \frac{\text{mass of salt actually produced}}{\text{maximum theoretical mass of salt that could be produced}} \times 100$$

Mass of salt actually produced = _____ g

[3 marks]

08.6 Some salts can be produced by reacting sulfuric acid with a metal.

Neither copper nor sodium is used to produce a salt with sulfuric acid.

Give **one** reason why each metal is **not** used.

[2 marks]

Copper

Sodium

Q2 · June 2024 · Paper 1 Higher · Q5 · [10 marks]

This question also needs Atomic structure and the periodic table and Bonding, structure, and the properties of matter.

This question is about ionic compounds and electrolysis.

Calcium chloride is an ionic compound.

05.1 Calcium and chlorine react to produce calcium chloride.

Describe what happens to calcium atoms and chlorine atoms when the ionic compound calcium chloride is formed.

[4 marks]

05.2 Solid calcium chloride **cannot** be electrolysed.

Give **one** reason why.

[1 mark]

05.3 Name the product formed at the negative electrode when aqueous calcium chloride solution is electrolysed.

[1 mark]

05.4 What is the half equation for the reaction at the positive electrode when aqueous calcium chloride solution is electrolysed?

Tick (✓) **one** box.

$2Cl^- \rightarrow Cl_2 + 2e^-$	☐
$Cl_2 + 2e^- \rightarrow 2Cl^-$	☐
$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$	☐
$O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$	☐

[1 mark]

05.5 A student investigated the electrolysis of green copper chromate solution.

Figure 4 shows the apparatus.

Figure 4

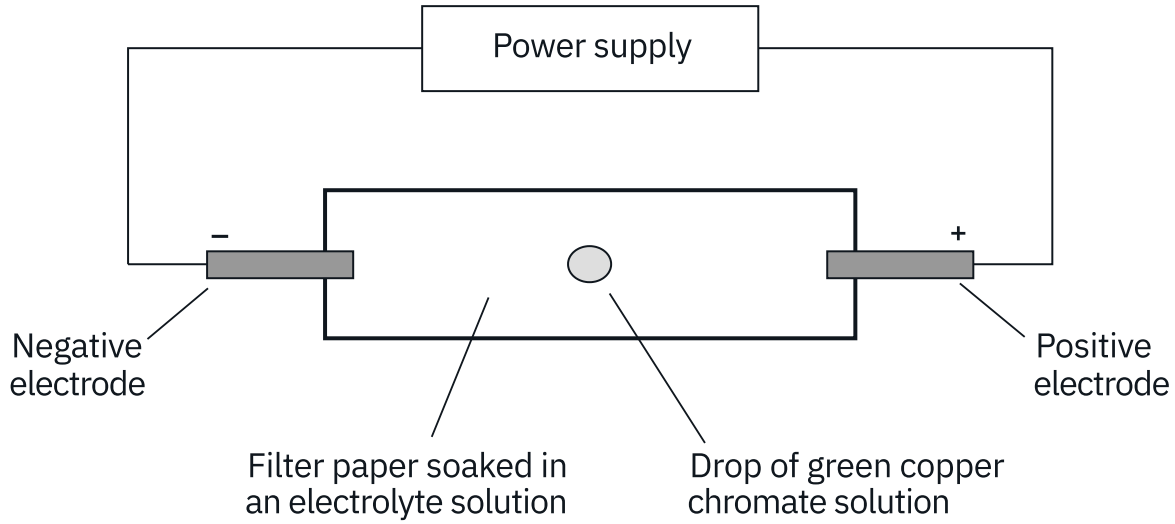
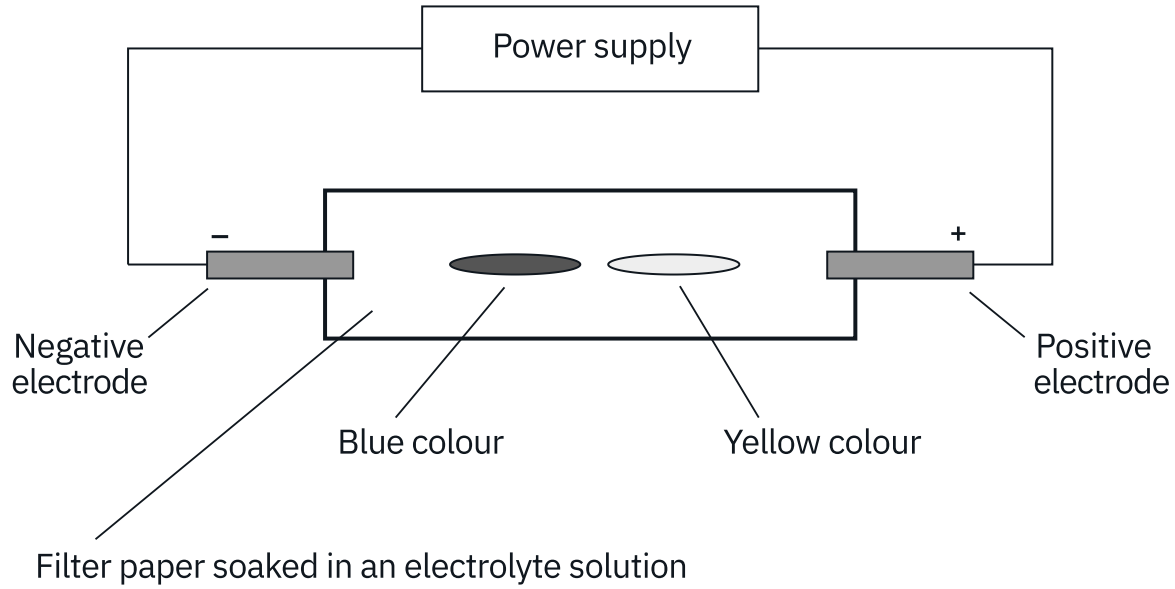


Figure 5 shows the results.

Figure 5



Copper chromate solution contains the ions Cu^{2+} and CrO_4^{2-}

Explain the results shown in Figure 5.

[3 marks]

Q3 · June 2024 · Paper 1 Higher · Q9 · [12 marks]

This question also needs Atomic structure and the periodic table and Quantitative chemistry.

This question is about acids and their reactions.

Acids can be either weak or strong.

09.1 What is meant by 'a **weak** acid'?

[2 marks]

09.2 Explain what happens to the pH of an acid as the acid is diluted with water.

[2 marks]

09.3 A student does a titration to find the volume of acid needed to neutralise an alkali.

The student fills a burette with the acid.

Give **three** more steps the student must do before adding the acid to the alkali from the burette.

You should name any equipment used.

[3 marks]

1

2

3

09.4 The student titrated a solution containing 0.0045 moles of sodium hydroxide with 0.15 mol/dm^3 hydrochloric acid.

The equation for the reaction is:

$NaOH + HCl \rightarrow NaCl + H_2O$

Calculate the volume of hydrochloric acid in cm^3 needed in the titration.

Volume of acid = _____ cm^3

[2 marks]

09.5 A calcium atom is larger than a magnesium atom.

Explain why calcium reacts more vigorously than magnesium with hydrochloric acid of the same concentration.

[3 marks]

Q4 · June 2025 · Paper 1 Higher · Q6 · [11 marks]

This question also needs Atomic structure and the periodic table and Bonding, structure, and the properties of matter.

Aluminium is extracted by the electrolysis of a molten mixture.

The mixture contains aluminium oxide and one other substance.

06.1 Aluminium oxide is an ionic compound.

Explain why aluminium oxide has a very high melting point.

[4 marks]

06.2 Name the substance added to aluminium oxide to form the mixture.

[1 mark]

06.3 Give **one** reason why a mixture is used as the electrolyte.

[1 mark]

06.4 Oxygen is produced at the positive electrode.

Write the half equation for the reaction that produces oxygen at the positive electrode.

→ +

[2 marks]

06.5 The positive electrode must be continually replaced.

Explain why.

[3 marks]

Q5 · June 2025 · Paper 1 Higher · Q8 · [13 marks]

This question also needs Quantitative chemistry.

This question is about alkalis and acids.

08.1 What is the formula of the ion that **all** alkalis contain when in solution?

[1 mark]

08.2 A student planned a titration experiment to determine the concentration of a sodium hydroxide solution.

This is the student's plan.

1. Measure 25.0 cm^3 of sulfuric acid of known concentration using a pipette.

2. Add the sulfuric acid to a conical flask.

3. Add 3 drops of universal indicator to the conical flask.

4. Place the conical flask on a white tile.

5. Fill a burette with sodium hydroxide solution to the 0.00 cm^3 mark.

6. Add sodium hydroxide solution to the conical flask and swirl the flask.

7. Stop adding sodium hydroxide solution when there is a colour change.

8. Record the volume of sodium hydroxide solution used.

9. Repeat steps 1 to 8 until consistent results are obtained.

Suggest **two** improvements to the plan.

Give **one** reason for each improvement.

[4 marks]

Improvement 1

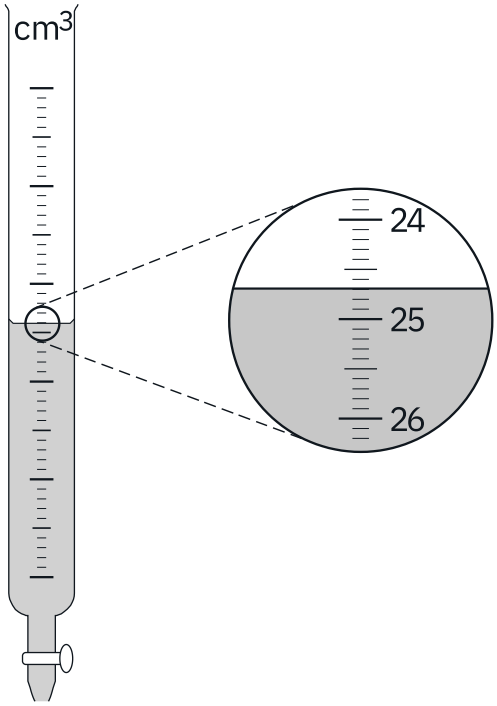
Reason

Improvement 2

Reason

08.3 Figure 9 shows the burette after one titration.

Figure 9



What is the reading on the burette?

cm^3

[1 mark]

08.4 In a different titration, 25.0 cm^3 of 0.216 mol/dm^3 sulfuric acid needed 11.25 cm^3 of sodium hydroxide solution for neutralisation.

The equation for the reaction is:

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Calculate the concentration of the sodium hydroxide solution.

Concentration = _____ mol/dm^3

[4 marks]

08.5 Table 4 gives information about solutions of two acids.

Table 4

Formula of acid	Concentration of solution in mol/dm^3	Percentage (%) of acid molecules that are ionised
HCl	0.1	100
HCN	2.0	0.01

Which is a correct statement about the solutions of HCl and HCN in Table 4?

Tick (✓) **one** box.

The HCl is a more concentrated and stronger acid than the HCN.	☐
The HCl is a more concentrated and weaker acid than the HCN.	☐
The HCl is a more dilute and stronger acid than the HCN.	☐
The HCl is a more dilute and weaker acid than the HCN.	☐

[1 mark]

08.6 In Table 4, the solution of HCl has a lower pH than the solution of HCN.

Explain why.

Use the data in Table 4.

[2 marks]

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Mark scheme:
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