AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.3.4

Halides

Past-paper questions

Tier	**Foundation**
Question groups	**19**
Available paper years	**2010–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.8.3.4 Halides

Question 01

4 Alums are salts. They have been used since ancient times in dyeing and medicine and still have many uses today.

Three alums are shown in the table:

Name	Ions present		
Ammonium alum	NH_4^+	Al^{3+}	SO_4^{2-}
Potassium alum	K^+	Al^{3+}	SO_4^{2-}
Sodium alum	Na^+	Al^{3+}	SO_4^{2-}

A student tested these alums to show which ions were present.

4 (a) The student did a flame test on these alums. A sample of each alum was held on a wire in a colourless flame.

In (a)(i) and (a)(ii) use the correct word from the box to complete each sentence.

blue	**lilac**	**yellow**	**green**

4 (a) (i) Sodium ions give a ..... flame.

(1 mark)

4 (a) (ii) Potassium ions give a ..... flame.

(1 mark)

4 (a) (iii) Draw a ring around the correct answer to complete the sentence.

The wire used in a flame test should have a high

density.
electrical conductivity.
melting point.

(1 mark)

4.8.3.4 Halides

Question 01 · continued

for mark

4 (b) Draw a ring around the correct word to complete the sentences.

4 (b) (i) The student tested a solution of each salt for sulfate ions (SO_4^{2-}).

The student added dilute hydrochloric acid and [barium chloride / nitric acid / silver nitrate] solution and a white [gas / liquid / solid] was formed.

(2 marks)

4 (b) (ii) The student tested a solution of each salt for aluminium ions (Al^{3+}).

The student added sodium hydroxide solution and a [green / red / white] precipitate was formed. When excess sodium hydroxide solution was added, the precipitate [boiled. / condensed. / dissolved.]

(2 marks)

7

4.8.3.4 Halides

Question 02

June 2010 | CHY2F | Original Q5 | Legacy

5 This question is about lead iodide and magnesium iodide.

5 (a) Lead iodide can be made by mixing a solution containing lead ions with a solution containing iodide ions.

Lead iodide is formed as a solid.

lead ions in solution + iodide ions in solution → lead iodide solid

5 (a) (i) Draw a ring around the name given to this type of reaction.

electrolysis **neutralisation** **precipitation**

(1 mark)

5 (a) (ii) Tick (✓) the method used to separate solid lead iodide from the solution.

Method	Tick (✓)
distillation	
evaporation	
filtration	

(1 mark)

5 (a) (iii) The table below gives information about the solubility of some compounds.

Soluble compounds	Insoluble compounds
all sodium and potassium salts	
all nitrates	
most chlorides, bromides and iodides	silver and lead chlorides, bromides and iodides

Use the table to help you to:

draw a ring around a soluble compound which contains lead ions

lead bromide **lead chloride** **lead nitrate**

draw a ring around a soluble compound which contains iodide ions.

lead iodide **silver iodide** **sodium iodide**

(2 marks)

4.8.3.4 Halides

Question 02 · continued

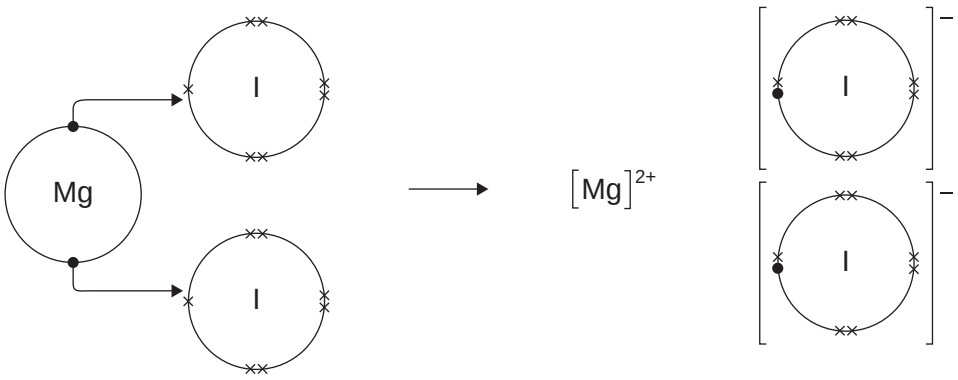
5 (b) Magnesium iodide can be made by reacting magnesium with iodine.

magnesium + iodine → magnesium iodide

The diagram shows how this takes place.

Only the outer electrons are shown.

The dots (•) and crosses (×) are used to represent electrons.



Use the diagram to help you to answer this question.

Describe, as fully as you can, what happens when magnesium reacts with iodine to make magnesium iodide.

To gain full marks you should use the words atom, electron and ion in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

8

4.8.3.4 Halides

Question 03

June 2010 | CHY3F | Original Q4 | Legacy

4 Chemical tests can be used to detect and identify elements and compounds.

A jar of a chemical from 1870 is shown.



Copperas was a name used for iron(II) sulfate, $FeSO_4$. It does not contain any copper!

4 (a) A student tested solutions of copperas to show which ions it contained.

Draw a ring around the correct answer to complete each sentence.

4 (a) (i) The student tested for iron(II) ions, Fe^{2+}

The student added a solution of

barium chloride.

silver nitrate.

sodium hydroxide.

The colour of the precipitate formed was

green.

red.

white.

The precipitate was a

liquid.

gas.

solid.

(3 marks)

4.8.3.4 Halides

Question 03 · continued

4 (a) (ii) The student tested for sulfate ions, SO_4^{2-}

The student added dilute hydrochloric acid and [barium chloride / silver nitrate / sodium hydroxide] solution.

The colour of the precipitate formed was [green. / red. / white.]

Sulfuric acid (H_2SO_4) should **not** be used instead of hydrochloric acid (HCl) when testing for sulfate ions. This is because sulfuric acid contains [chloride ions, Cl^- / nitrate ions, NO_3^- / sulfate ions, SO_4^{2-}]

(3 marks)

4 (b) A flame test can be used to identify the metal ions in a compound.

How do you carry out a flame test?

.....

.....

(1 mark)

4 (c) The elements in a compound can also be detected and identified using instrumental methods of analysis.

State **one** advantage of using instrumental methods compared with chemical tests.

.....

.....

(1 mark)

8

4.8.3.4 Halides

Question 04

January 2011 | CHY3F | Original Q2 | Legacy

2 Read the information in the box and then answer the questions.

> Seidlitz Powder is a medicine.
>
> Seidlitz Powder comes as two powders. One powder is wrapped in white paper and contains tartaric acid. The other powder is wrapped in blue paper and contains sodium hydrogencarbonate.
>
> The contents of the blue paper are dissolved in water and the contents of the white paper are added. This causes a reaction that produces carbon dioxide gas. The mixture is safe to drink when the reaction stops.

2 (a) Suggest why Seidlitz Powder comes as two separate powders.

.....

(1 mark)

2 (b) The reaction produces carbon dioxide gas.

2 (b) (i) What would you see during the reaction?

.....

(1 mark)

2 (b) (ii) Which state symbol in a chemical equation shows that carbon dioxide is a gas?

Draw a ring around **one** answer.

(s) **(l)** **(aq)** **(g)**

(1 mark)

2 (b) (iii) Draw a ring around the correct answer to complete the sentence.

Carbon dioxide can be identified because it turns [limescale / limestone / limewater] milky.

(1 mark)

4.8.3.4 Halides

Question 04 · continued

2 (c) Sodium hydrogencarbonate contains sodium ions. Sodium ions can be identified by flame tests.

Draw a ring around the correct answer to complete the sentence.

Sodium ions give a [blue / red / yellow] flame.

(1 mark)

2 (d) Some Seidlitz Powder was bought on the Internet for £5. However, when tested, it was found to be only magnesium sulfate, worth a few pence.

Draw a ring around the correct answer to complete each sentence.

2 (d) (i) The test for sulfate ions uses [barium chloride / silver nitrate / sodium hydroxide] solution.

(1 mark)

2 (d) (ii) A positive test for sulfate ions produces a [blue / red / white] precipitate.

(1 mark)

2 (d) (iii) Suggest **one** disadvantage of buying medicines on the Internet.

.....

.....

(1 mark)

8

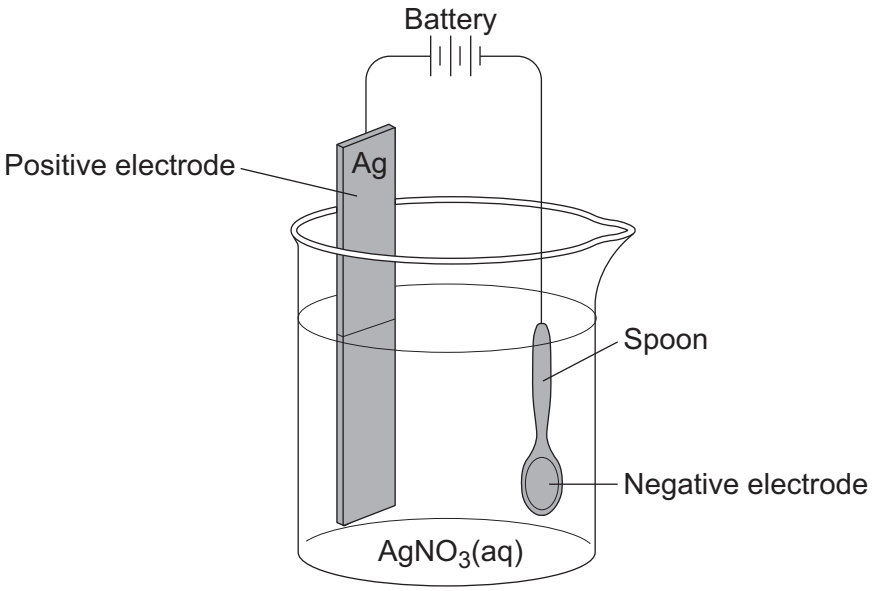
4.8.3.4 Halides

Question 05

June 2011 | CHY2F | Original Q4 | Legacy

4 Electroplating is used to coat a cheap metal with a thin layer of an expensive metal.

In the diagram a teaspoon made of nickel is being coated with silver.



Silver nitrate, $AgNO_3$, contains silver ions (Ag^+) and nitrate ions (NO_3^-).

4 (a) Solid silver nitrate, $AgNO_3(s)$, does **not** conduct electricity.

Choose the correct answer in the box to complete the sentence.

are too big	**cannot move**	**are too small**

Solid silver nitrate does **not** conduct electricity because the ions

.....

(1 mark)

4 (b) What substance is added to $AgNO_3(s)$ to turn it into $AgNO_3(aq)$?

Draw a ring around the correct answer.

petrol **alcohol** **water**

(1 mark)

4.8.3.4 Halides

Question 05 · continued

4 (c) Draw a ring around the correct answer to complete each sentence.

4 (c) (i) Silver ions move to the negative electrode because they have

no charge.

a negative charge.

a positive charge.

(1 mark)

4 (c) (ii) When silver ions reach the negative electrode they turn into silver

atoms.

compounds.

molecules.

(1 mark)

4

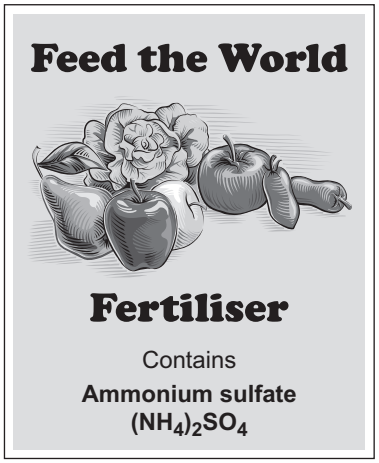
Turn over for the next question

4.8.3.4 Halides

Question 06

June 2011 | CHY3F | Original Q3 | Legacy

3 Ammonium sulfate is an artificial fertiliser.



3 (a) A student tested this fertiliser to prove that it contained ammonium ions and sulfate ions.

Draw a ring around the correct answer to complete each sentence.

3 (a) (i) Test for ammonium ions (NH_4^+).

The student added [sodium chloride solution / sodium hydroxide solution / dilute sulfuric acid] to the fertiliser.

A gas called ammonia was produced.

Ammonia turns damp litmus paper [blue. / green. / red.]

(2 marks)

3 (a) (ii) Test for sulfate ions (SO_4^{2-}).

The student added [barium chloride / silver nitrate / sodium chloride] solution to a solution of the fertiliser.

A [blue / red / white] precipitate was formed.

(2 marks)

4.8.3.4 Halides

Question 06 · continued

3 (b) Ammonium sulfate is made by reacting sulfuric acid with ammonia solution.

Sulfuric acid is a *strong* acid.

Draw a ring around the correct answer to complete the sentence.

The word *strong* means that the acid is

- difficult to break.
- very concentrated.
- fully ionised in water.

(1 mark)

3 (c) Use the information about acids in the table to help you answer these questions.

Name of chemical	Ions produced in aqueous solution		pH	Universal Indicator added
Ethanoic acid	H^+	CH_3COO^-	5	Goes orange
Sulfuric acid	H^+	SO_4^{2-}	1	Goes red

Draw a ring around the correct answer to complete each sentence.

3 (c) (i) Sulfuric acid and ethanoic acid are both acids because they contain

- CH_3COO^- ions.
- H^+ ions.
- SO_4^{2-} ions.

(1 mark)

3 (c) (ii) Sulfuric acid is a stronger acid than ethanoic acid.

The pH of stronger acids is

- higher than
- lower than
- the same as

the pH of weaker acids.

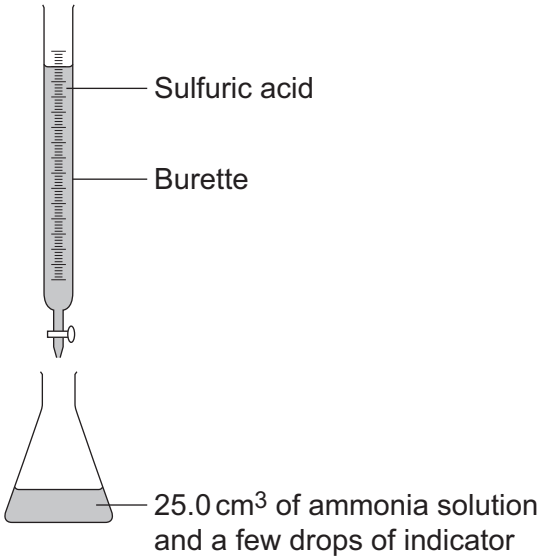
(1 mark)

4.8.3.4 Halides

Question 06 · continued

3 (d) The volume of sulfuric acid that reacts with 25.0 cm^3 of ammonia solution can be found by titration.

The diagram shows the apparatus used for the titration.



A student did the titration five times and recorded the following results.

Titration	1	2	3	4	5
Volume of acid added in cm^3	13.3	13.9	13.2	13.1	13.2

3 (d) (i) How did the student know when enough sulfuric acid had been added to neutralise the ammonia solution?

.....

.....

(1 mark)

3 (d) (ii) The student did **not** use one of the results because it was anomalous.

Which result was anomalous? .....

(1 mark)

3 (d) (iii) Use the **other** four results to calculate the mean volume of sulfuric acid that reacted with the ammonia.

.....

.....

Mean volume = ... cm^3

(1 mark)

10

4.8.3.4 Halides

Question 07

June 2014 | CH3FP | Original Q6 | Legacy

6 (a) The colours of fireworks are produced by chemicals.

Figure 8



Three of these chemicals are lithium sulfate, potassium chloride and sodium nitrate.

6 (a) (i) A student wants to carry out flame tests on these three chemicals.

Describe how to carry out a flame test.

[2 marks]

.....

.....

.....

.....

6 (a) (ii) Draw **one** line from each chemical to the correct flame colour.

The first one has been done for you.

[2 marks]

Chemical	Flame colour
lithium sulfate	crimson
potassium chloride	
sodium nitrate	
	green
	yellow
	lilac

4.8.3.4 Halides

Question 07 · continued

6 (a) (iii) Dilute nitric acid and silver nitrate solution are added to solutions of the three chemicals.

A white precipitate forms in one of the solutions.

Which chemical produces the white precipitate?

[1 mark]

.....

6 (b) The student tests a fourth chemical, **X**.

6 (b) (i) The student adds sodium hydroxide solution to a solution of chemical **X**.

A blue precipitate is formed.

Which metal ion is in chemical **X**?

[1 mark]

.....

6 (b) (ii) The student adds dilute hydrochloric acid to a solution of chemical **X** and then adds barium chloride solution.

A white precipitate is formed.

Which negative ion is in chemical **X**?

Draw a ring around the correct answer.

[1 mark]

chloride **nitrate** **sulfate**

7

4.8.3.4 Halides

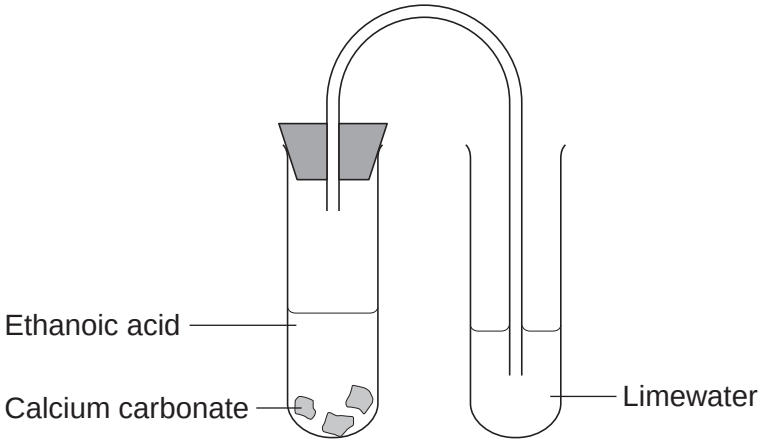
Question 08

June 2016 | CH3FP | Original Q5 | Legacy

5 This question is about reactions of ethanoic acid and the analysis of salts.

5 (a) **Figure 7** shows the apparatus used to investigate the reaction of ethanoic acid with calcium carbonate.

Figure 7



5 (a) (i) Describe a change that would be seen in each test tube.

Give a reason for each change.

[4 marks]

Test tube 1 _____

_____

_____

_____

Test tube 2 _____

_____

_____

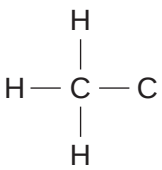
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Question 5 continues on the next page

Question 08 · continued

5 (a) (ii) Complete the displayed structure of ethanoic acid.

[1 mark]



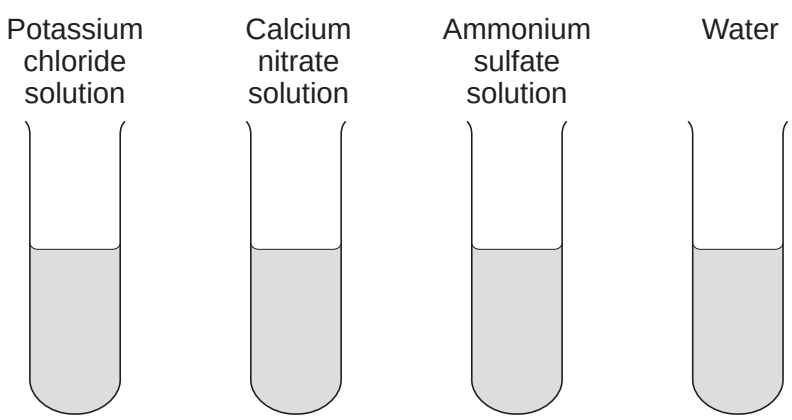
5 (a) (iii) Ethanoic acid is a carboxylic acid.
Complete the sentence.

[2 marks]

Carboxylic acids react with alcohols in the presence of an _____ catalyst to produce pleasant-smelling compounds called _____ .

5 (b) **Figure 8** shows four test tubes containing three different salt solutions and water.

Figure 8



Each solution and the water was tested with:

- silver nitrate in the presence of dilute nitric acid
- barium chloride in the presence of dilute hydrochloric acid.

4.8.3.4 Halides

Question 08 · continued

Complete the table of results.

[2 marks]

	Potassium chloride solution	Calcium nitrate solution	Ammonium sulfate solution	Water
Test with silver nitrate in the presence of dilute nitric acid			no change	no change
Test with barium chloride in the presence of dilute hydrochloric acid		no change	white precipitate	

5 (c) Flame tests can be used to identify metal ions.

5 (c) (i) Complete the following sentences.

[2 marks]

The flame colour for potassium ions is _____ .

The flame colour for calcium ions is _____ .

5 (c) (ii) Give **one** reason why a flame test would **not** show the presence of both potassium ions and calcium ions in a mixture.

[1 mark]

_____

_____

_____

12

4.8.3.4 Halides

Question 09

June 2017 | CH3FP | Original Q1 | Legacy

1 This question is about elements and compounds.

1 (a) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

densities	numbers	weights

The elements in the modern periodic table are arranged in order of their atomic _____ .

1 (a) (ii) Use the correct answer from the box to complete the sentence.

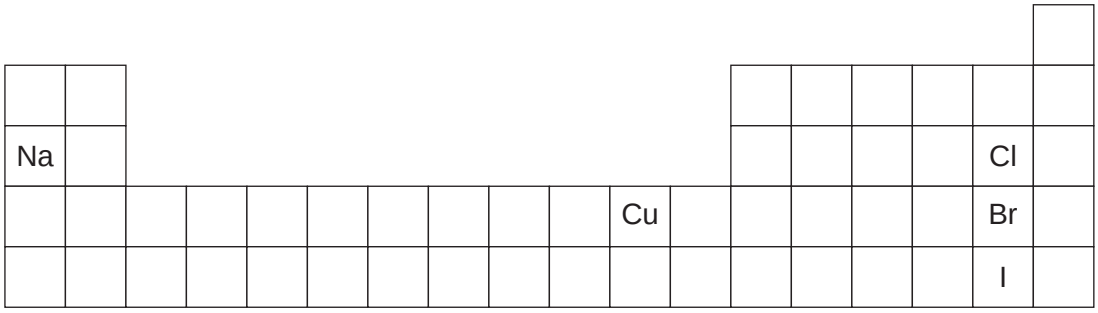
[1 mark]

electrons	neutrons	protons

The outer shells of atoms of elements in the same group have the same number of _____ .

1 (b) **Figure 1** shows the position of five elements in the modern periodic table.

Figure 1



1 (b) (i) Which **one** of the elements in **Figure 1** is a gas at room temperature?

[1 mark]

_____

4.8.3.4 Halides

Question 09 · continued

1 (b) (ii) Which **one** of the elements in **Figure 1** is a transition metal?

[1 mark]

_____

1 (b) (iii) Complete the sentence.

[1 mark]

In the modern periodic table, bromine (Br) is in Group _____ .

1 (c) Bromine reacts with sodium iodide to produce iodine.

The word equation for the reaction is:

bromine + sodium iodide ⟶ iodine + sodium bromide

1 (c) (i) What type of reaction is this?

[1 mark]

Tick (✓) **one** box.

Combustion ☐

Displacement ☐

Neutralisation ☐

1 (c) (ii) Use the Chemistry Data Sheet to help you answer this question.

Which halogen would react with sodium chloride solution to produce chlorine?

[1 mark]

Tick (✓) **one** box.

Bromine ☐

Fluorine ☐

Iodine ☐

Question 1 continues on the next page

4.8.3.4 Halides

Question 09 · continued

1 (d) Silver nitrate in the presence of dilute nitric acid is used to test for iodide ions.

What colour precipitate is produced?

[1 mark]

Tick (✓) **one** box.

Cream ☐

White ☐

Yellow ☐

4.8.3.4 Halides

Question 09 · continued

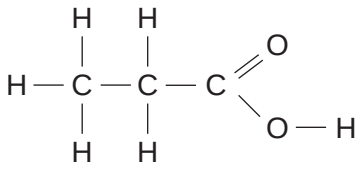
1 (e) Propanoic acid is a compound containing carbon atoms.

1 (e) (i) **Figure 2** shows the displayed structure of propanoic acid.

Draw a ring around the functional group of propanoic acid in **Figure 2**.

[1 mark]

Figure 2



1 (e) (ii) Use the correct answer from the box to complete the sentence.

[1 mark]

carbon dioxide	hydrogen	oxygen

Propanoic acid reacts with carbonates to produce _____ .

1 (e) (iii) Use the correct answer from the box to complete the sentence.

[1 mark]

alkalis	esters	fuels

Propanoic acid reacts with alcohols to produce pleasant smelling compounds called _____ .

11

4.8.3.4 Halides

Question 10

June 2019 | 8462/2F | Original Q1

0 1 This question is about drinking water.

There are two main steps in producing drinking water from fresh water.

0 1 . 1 Draw **one** line from each step to the reason for the step.

[2 marks]

Step	Reason for step
	Desalination
Filtration	Improve taste
	Increase pH
Sterilisation	Kill bacteria
	Remove solids

0 1 . 2 Which **two** substances are used to sterilise fresh water?

[2 marks]

Tick (✓) **two** boxes.

- Ammonia ☐
- Chlorine ☐
- Hydrogen ☐
- Nitrogen ☐
- Ozone ☐

4.8.3.4 Halides

Question 10 · continued

A large amount of aluminium sulfate was accidentally added to the drinking water supply at a water treatment works.

0 1 . 3 Scientists tested a sample of the drinking water to show that it contained dissolved solids.

Which **two** methods show the presence of dissolved solids in the sample of drinking water?

[2 marks]

Tick (✓) **two** boxes.

- Add damp litmus paper to the sample. ☐
- Evaporate all water from the sample. ☐
- Measure the sample's boiling point. ☐
- Test the sample with a glowing splint. ☐

4.8.3.4 Halides

Question 10 · continued

0 1 . 4 Scientists tested two water samples from the drinking water supply.

The scientists tested one sample for aluminium ions and the other sample for sulfate ions.

Draw **one** line from each ion to the compound needed to identify the ion.

[2 marks]

Ion	Compound needed to identify ion
	Barium chloride
Aluminium ion	Copper sulfate
	Silver nitrate
Sulfate ion	Sodium hydroxide
	Sulfuric acid

0 1 . 5 How could pure water be produced from drinking water that contained dissolved solids?

[1 mark]

Tick (✓) **one** box.

- Chromatography ☐
- Cracking ☐
- Distillation ☐
- Sedimentation ☐

9

4.8.3.4 Halides

Question 11

November 2020 | 8462/1F | Original Q4

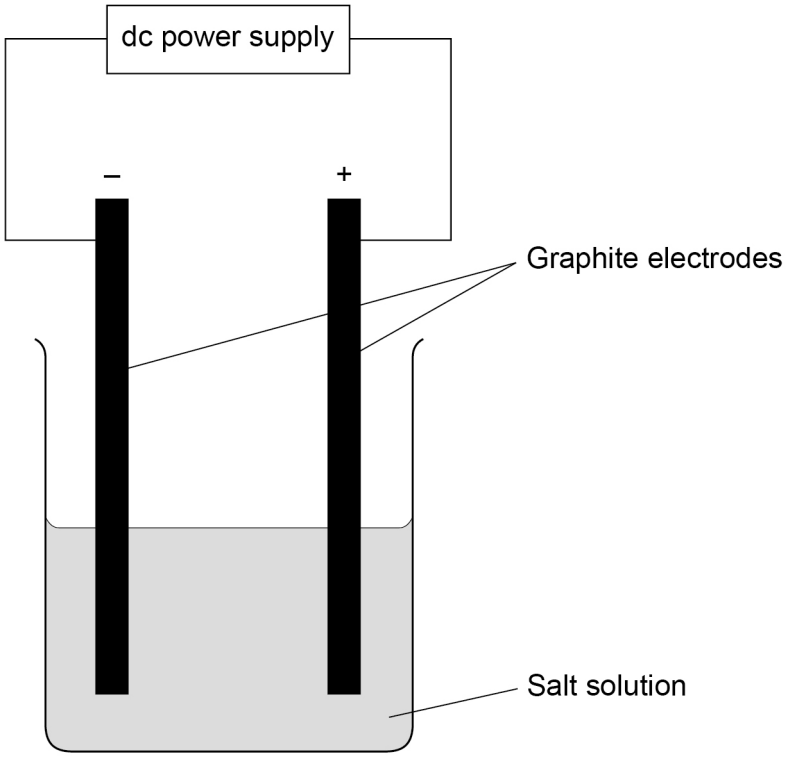
0 4 This question is about electrolysis.

A student investigated the hypothesis:

'The electrolysis of a salt solution produces a metal at the negative electrode and a gas at the positive electrode.'

Figure 4 shows the apparatus used.

Figure 4



0 4 . 1 What observation would be made at each electrode if the hypothesis is correct?

[2 marks]

Observation if metal produced at the negative electrode _____

_____

Observation if gas produced at the positive electrode _____

_____

4.8.3.4 Halides

Question 11 · continued

Table 3 shows the student's results.

Table 3

Salt solution	Product at the negative electrode	Product at the positive electrode
Copper chloride	Copper	Chlorine
Potassium nitrate	Hydrogen	Oxygen
Silver nitrate	Silver	Oxygen

0 4 . 2 Which salt solution in **Table 3** does **not** match the student's hypothesis?

Give **one** reason why.

[2 marks]

Salt solution _____

Reason _____

_____

0 4 . 3 Give **two** reasons why graphite is used for the electrodes.

[2 marks]

1 _____

_____

2 _____

_____

4.8.3.4 Halides

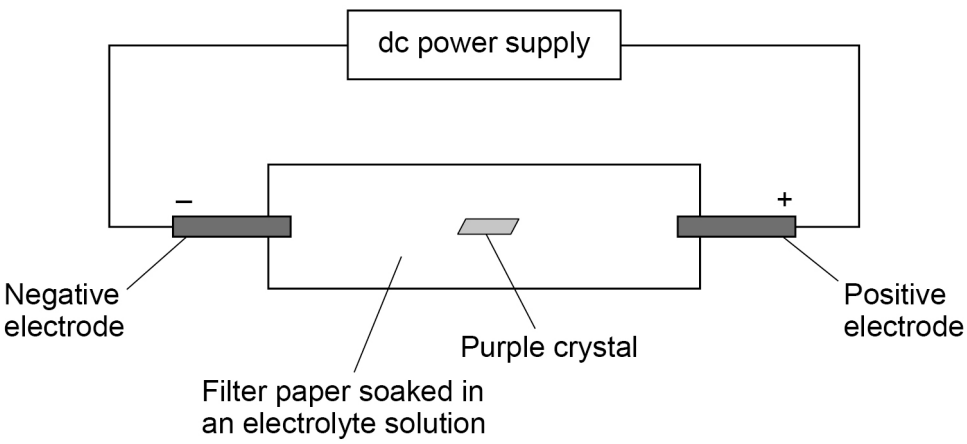
Question 11 · continued

November 2020 | 8462/1F | Original Q4

A different student investigated what happens during electrolysis.

Figure 5 shows the apparatus.

Figure 5



The purple crystal contained:

- colourless positive ions
- purple coloured negative ions.

The purple crystal dissolved in the electrolyte solution.

0 4 . 4 What happens to the purple coloured ions?

Give **one** reason for your answer.

[2 marks]

Tick (✓) **one** box.

The ions do not move. ☐

The ions move towards the negative electrode. ☐

The ions move towards the positive electrode. ☐

Reason _____

_____

8

4.8.3.4 Halides

Question 12

November 2020 | 8462/1F | Original Q9

0 9 This question is about metals and the reactivity series.

0 9 . 1 Which **two** statements are properties of most transition metals?

[2 marks]

Tick (✓) **two** boxes.

- They are soft metals. ☐
- They form colourless compounds. ☐
- They form ions with different charges. ☐
- They have high melting points. ☐
- They have low densities. ☐

0 9 . 2 A student added copper metal to colourless silver nitrate solution.

The student observed:

- pale grey crystals forming
- the solution turning blue.

Explain how these observations show that silver is less reactive than copper.

[3 marks]

4.8.3.4 Halides

Question 12 · continued

0 9 . 3 A student is given three metals, **X**, **Y** and **Z** to identify.

The metals are magnesium, iron and copper.

Plan an investigation to identify the three metals by comparing their reactions with dilute hydrochloric acid.

Your plan should give valid results.

[4 marks]

Question 9 continues on the next page

4.8.3.4 Halides

Question 12 · continued

0 9 . 4 Metal **M** has two isotopes.

Table 6 shows the mass numbers and percentage abundances of the isotopes.

Table 6

Mass number	Percentage abundance (%)
203	30
205	70

Calculate the relative atomic mass (A_r) of metal **M**.

Give your answer to 1 decimal place.

[2 marks]

Relative atomic mass (1 decimal place) = _____

11

4.8.3.4 Halides

Question 13

November 2020 | 8462/1F | Original Q10

1 0 This question is about silver iodide.

Silver iodide is produced in the reaction between silver nitrate solution and sodium iodide solution.

The equation for the reaction is:

$$AgNO_3(aq) + NaI(aq) \rightarrow AgI(s) + NaNO_3(aq)$$

1 0 . 1 A student investigated the law of conservation of mass.

This is the method used.

1. Pour silver nitrate solution into a beaker labelled **A**.
2. Pour sodium iodide solution into a beaker labelled **B**.
3. Measure the masses of both beakers and their contents.
4. Pour the solution from beaker **B** into beaker **A**.
5. Measure the masses of both beakers and their contents again.

Table 7 shows the student's results.

Table 7

	Mass before mixing in g	**Mass after mixing in g**
Beaker **A** and contents	78.26	108.22
Beaker **B** and contents	78.50	48.54

Explain how the results demonstrate the law of conservation of mass.

You should use data from **Table 7** in your answer.

[2 marks]

4.8.3.4 Halides

Question 13 · continued

1 0 . 2 Suggest how the student could separate the insoluble silver iodide from the mixture at the end of the reaction.

[1 mark]

The student purified the separated silver iodide.

This is the method used.

1. Rinse the silver iodide with distilled water.

2. Warm the silver iodide.

1 0 . 3 Suggest **one** impurity that was removed by rinsing with water.

[1 mark]

1 0 . 4 Suggest why the student warmed the silver iodide.

[1 mark]

Question 10 continues on the next page

4.8.3.4 Halides

Question 13 · continued

1 0 . 5 Calculate the percentage atom economy for the production of silver iodide in this reaction.

The equation for the reaction is:

$$AgNO_3(aq) + NaI(aq) \rightarrow AgI(s) + NaNO_3(aq)$$

Give your answer to 3 significant figures.

Relative formula masses (M_r): $AgNO_3 = 170$ NaI = 150 AgI = 235 $NaNO_3 = 85$

[4 marks]

Percentage atom economy (3 significant figures) = _____ %

1 0 . 6 Give **one** reason why reactions with a high atom economy are used in industry.

[1 mark]

10

4.8.3.4 Halides

Question 14

November 2020 | 8462/2F | Original Q8

0 8 This question is about chemical analysis.

A student tested copper sulfate solution and calcium iodide solution using flame tests.

This is the method used.

1. Dip a metal wire in copper sulfate solution.

2. Put the metal wire in a blue Bunsen burner flame.

3. Record the flame colour produced.

4. Repeat steps 1 to 3 using the same metal wire but using calcium iodide solution.

0 8 . 1 What flame colour is produced by copper sulfate solution?

[1 mark]

0 8 . 2 Calcium compounds produce an orange-red flame colour.

The student left out an important step before reusing the metal wire.

The student's method did **not** produce a distinct orange-red flame colour using calcium iodide solution.

Explain why.

[2 marks]

4.8.3.4 Halides

Question 14 · continued

0 8 . 3 The student added sodium hydroxide solution to:

- copper sulfate solution
- calcium iodide solution.

Give the results of the tests.

[2 marks]

Copper sulfate solution _____

_____

Calcium iodide solution _____

_____

0 8 . 4 To test for sulfate ions the student added dilute hydrochloric acid to copper sulfate solution.

Name the solution that would show the presence of sulfate ions when added to this mixture.

[1 mark]

_____

0 8 . 5 To test for iodide ions the student added dilute nitric acid to calcium iodide solution.

Name the solution that would show the presence of iodide ions when added to this mixture.

Give the result of the test.

[2 marks]

Solution _____

Result _____

_____

8

4.8.3.4 Halides

Question 15

November 2021 | 8462/1F | Original Q7

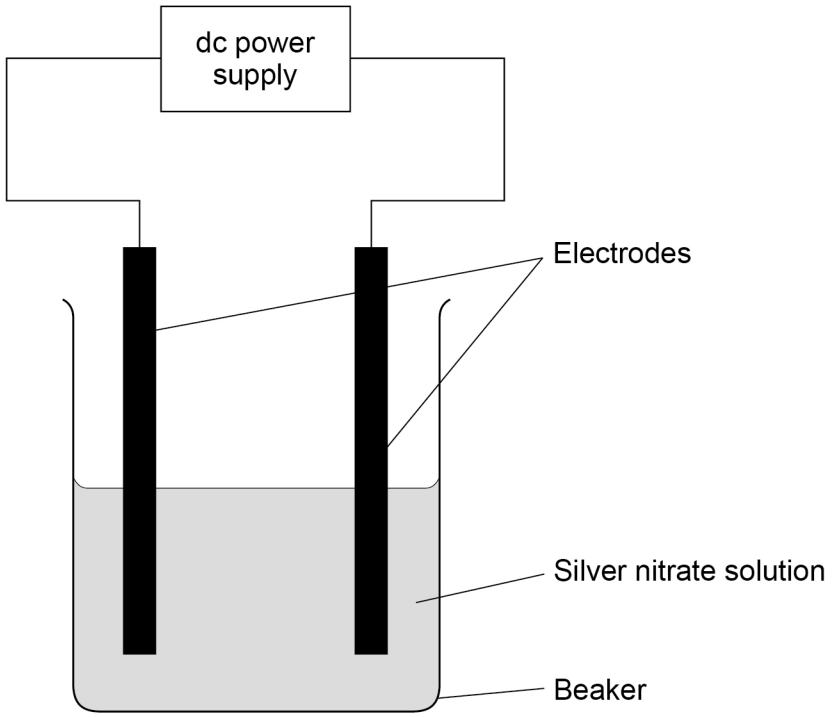
0 7 This question is about electrolysis.

Some students investigated the electrolysis of silver nitrate solution.

This electrolysis produces silver at the negative electrode.

Figure 11 shows the apparatus.

Figure 11



This is the method used.

1. Weigh the negative electrode.
2. Set up the apparatus shown in **Figure 11**.
3. Switch on the power supply.
4. Switch off the power supply after five minutes.
5. Rinse the negative electrode with water and allow to dry.
6. Reweigh the negative electrode.
7. Repeat steps 1 to 6 for different times.

Question 15 · continued

0 7 . 1 Some silver did not stick to the negative electrode but fell to the bottom of the beaker.

The students needed to weigh this silver.

How could the students separate the silver from the silver nitrate solution?

[1 mark]

Tick (✓) **one** box.

By chromatography ☐

By crystallisation ☐

By distillation ☐

By filtration ☐

Table 5 shows the students' results.

Table 5

Time in minutes	Mass of silver in g
0	0.00
5	0.06
10	0.12
15	0.18
20	0.24
25	0.30

4.8.3.4 Halides

Question 15 · continued

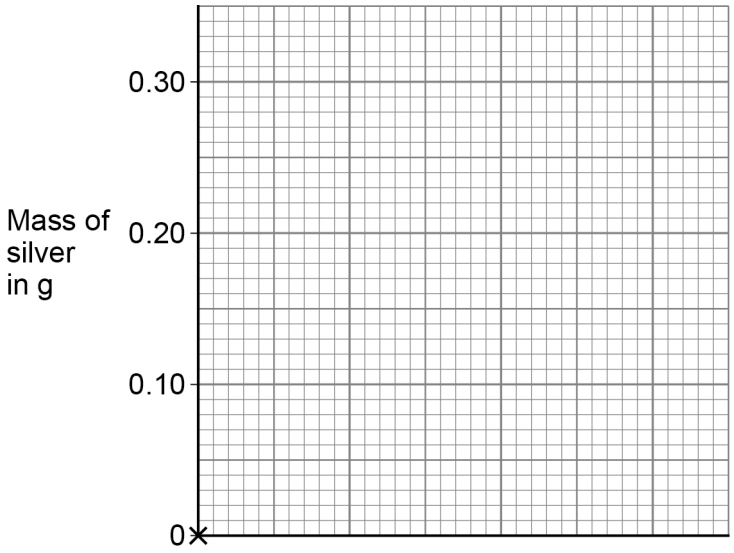
0 7 . 2 Draw a graph on **Figure 12**.

You should:

- use a suitable scale for the x-axis
- plot the data from **Table 5**
- draw a line of best fit.

[4 marks]

Figure 12



0 7 . 3 Determine the mass of silver that would be produced after 12 minutes.

Use **Figure 12**.

[1 mark]

Mass of silver = _____ g

Question 7 continues on the next page

4.8.3.4 Halides

Question 15 · continued

0 7 . 4 A student investigated the electrolysis of two aqueous salt solutions.

Hydrogen is produced at the negative electrode when the metal in the salt solution is more reactive than hydrogen.

Complete **Table 6** to show what the student would **observe** at the negative electrode for each salt solution.

[2 marks]

Table 6

Salt solution	Observation at negative electrode
Copper sulfate	
Sodium chloride	

0 7 . 5 A teacher demonstrates the electrolysis of molten lead bromide.

The products at the electrodes are lead and bromine.

Why should the teacher do the demonstration in a fume cupboard?

[1 mark]

0 7 . 6 Two other molten compounds are electrolysed.

Complete **Table 7** to show the molten compounds and the products.

[3 marks]

Table 7

Molten compound electrolysed	Product at the negative electrode	Product at the positive electrode
Zinc chloride		
	Potassium	Iodine

12

4.8.3.4 Halides

Question 16

November 2021 | 8462/2F | Original Q6

0 6 Potash alum is a chemical compound.

Potash alum contains potassium ions, aluminium ions and sulfate ions.

0 6 . 1 Which **two** methods can be used to identify the presence of potassium ions in potash alum solution?

[2 marks]

Tick (✓) **two** boxes.

- Flame emission spectroscopy ☐
- Flame test ☐
- Measuring boiling point of solution ☐
- Paper chromatography ☐
- Using litmus paper ☐

0 6 . 2 Sodium hydroxide solution is used to test for some metal ions.

Sodium hydroxide solution is added to a solution of potash alum until a precipitate forms.

Complete the sentence.

Choose the answer from the box.

[1 mark]

blue	**brown**	**green**	**white**

The colour of the precipitate formed is _____.

4.8.3.4 Halides

Question 16 · continued

0 6 . 3 Complete the sentence.

Choose the answer from the box.

[1 mark]

barium chloride solution	**limewater**
red litmus paper	**silver nitrate solution**

Sulfate ions can be identified using dilute hydrochloric acid

and _____.

0 6 . 4 A solution of potash alum has a concentration of 258 g/dm^3

Calculate the mass of potash alum needed to make 800 cm^3 of a solution of potash alum with a concentration of 258 g/dm^3

Give your answer to 3 significant figures.

[4 marks]

Mass (3 significant figures) = _____ g

8

4.8.3.4 Halides

Question 17

June 2022 | 8462/2F | Original Q1

0 1 This question is about water.

A student investigated pure water.

The student measured:

- the boiling point of pure water
- the pH of pure water.

0 1 . 1 Complete the sentences.

Choose answers from the box.

[2 marks]

0	**4**	**7**	**10**	**25**	**100**

Pure water has a boiling point of _____ °C.

Pure water has a pH of _____.

0 1 . 2 What could the student use to measure the pH of pure water?

[1 mark]

_____

_____

4.8.3.4 Halides

Question 17 · continued

A different student investigated sea water.

Sea water contains dissolved solids.

This is the method used.

1. Measure a 50 cm^3 sample of the sea water.
2. Heat the sample until all the water has evaporated.
3. Measure the mass of solid that remains.
4. Repeat steps 1 to 3 three more times.

0 1 . 3 Which **two** pieces of equipment were needed in this investigation?

[2 marks]

Tick (✓) **two** boxes.

- Balance ☐
- Measuring cylinder ☐
- Ruler ☐
- Thermometer ☐
- Timer ☐

Question 1 continues on the next page

Question 17 · continued

0 1 . 4 **Table 1** shows the results.

Table 1

Sea water sample	Mass of solid that remained in grams
1	1.73
2	1.70
3	1.75
4	1.78

Calculate the mean mass of solid that remained.

[2 marks]

Mean mass = _____ g

0 1 . 5 A 50 cm^3 sample of sea water from a different source contained 1.50 g of dissolved solids.

Calculate the mass of dissolved solids in 1000 cm^3 of this sea water.

[2 marks]

Mass = _____ g

4.8.3.4 Halides

Question 17 · continued

Sodium chloride is a dissolved solid in sea water.

Sodium chloride contains sodium ions and chloride ions.

0 1 . 6 Complete the sentence.

Choose the answer from the box.

[1 mark]

crimson	lilac	yellow

The student tested sea water for sodium ions using a flame test.

The colour of the flame was _____.

0 1 . 7 Complete the sentence.

Choose the answer from the box.

[1 mark]

brown	green	white

The student tested sea water for chloride ions by adding nitric acid and silver nitrate solution.

The colour of the precipitate formed was _____.

11

4.8.3.4 Halides

Question 18

June 2023 | 8462/2F | Original Q10

1 0 This question is about chemical analysis.

Potassium bromide is used in medicine.

A scientist tested a sample of medicine to show the presence of potassium ions and of bromide ions.

The sample is soluble in water.

1 0 . 1 Plan a method the scientist could use to show that the sample of medicine contains potassium ions **and** bromide ions.

The scientist has:

- a Bunsen burner
- a metal wire
- test tubes
- a dropping pipette
- distilled water
- dilute nitric acid
- silver nitrate solution.

You should give the results of the tests.

[6 marks]

4.8.3.4 Halides

Question 18 · continued

The scientist could also use an instrumental method to show the presence of potassium ions in the medicine.

10.2 Which instrumental method could be used to show the presence of potassium ions in the medicine?

[1 mark]

10.3 Give **one** advantage of using this instrumental method instead of a chemical test.

[1 mark]

8

4.8.3.4 Halides

Question 19

June 2025 | 8462/2F | Original Q1

0 1 This question is about chemical analysis.

Some metal ions can be identified using a flame test.

0 1 . 1 Describe how to do a flame test using a metal wire and a Bunsen burner.

[2 marks]

0 1 . 2 Draw **one** line from each metal ion to the flame colour produced by the metal ion.

[2 marks]

Metal ion	Flame colour
Lithium	Crimson
Potassium	Green
	Lilac
	Orange-red
	Yellow

4.8.3.4 Halides

Question 19 · continued

0 1 . 3 Which gas is produced when carbonates are reacted with dilute acids?

[1 mark]

Tick (✓) **one** box.

Carbon dioxide ☐

Hydrogen ☐

Oxygen ☐

0 1 . 4 Which solution is used to test for sulfate ions?

[1 mark]

Tick (✓) **one** box.

Barium chloride solution ☐

Magnesium chloride solution ☐

Sodium chloride solution ☐

Precipitates are used to identify some ions.

0 1 . 5 Complete the sentence.

Choose the answer from the box.

[1 mark]

gas	**liquid**	**solid**

A precipitate is a _____.

4.8.3.4 Halides

Question 19 · continued

0 1 . 6 Some metal ions in solution can be identified by adding sodium hydroxide solution.

Draw **one** line from each metal ion to the colour of the precipitate produced by the metal ion.

[2 marks]

Metal ion	Colour of precipitate
Copper(II)	Blue
	Brown
Magnesium	Green
	White
	Yellow

0 1 . 7 Dilute nitric acid and silver nitrate solution were added to a solution containing iodide ions.

Complete the sentence.

Choose the answer from the box.

[1 mark]

brown	**green**	**yellow**

The colour of the precipitate produced is _____.

10