AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.2.6

Group 7

Past-paper questions

Tier	**Higher**
Question groups	**18**
Available paper years	**2007–2025**

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.

4.1.2.6 Group 7

Question 01

November 2007 | CHY1A | Original Q6 | Legacy

QUESTION SIX

The diagram shows part of the periodic table.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
	Be						
Na	Mg	Al	Si	P	S	Cl	Ar
	Ca						
	Sr						

The row of substances from sodium (Na) to argon (Ar) is called a period.

6A Magnesium (Mg) and calcium (Ca) are placed in the same group of the periodic table because they . . .

1 have a similar colour.

2 have similar boiling points.

3 have similar chemical properties.

4 are next to each other in the reactivity series.

6B Magnesium (Mg) and sulfur (S) are in the same period.

Which row in the table below correctly shows one similarity and one difference between magnesium and sulfur?

	Similarity	Difference
1	Both are solids.	Magnesium is a non-metal; sulfur is a metal.
2	Both conduct electricity.	Magnesium is a solid; sulfur is a gas.
3	Both are solids.	Magnesium conducts electricity; sulfur does not.
4	Both conduct electricity.	Magnesium is a metal; sulfur is a non-metal.

4.1.2.6 Group 7

Question 01 · continued

6C Calcium (Ca) is in the periodic table but quicklime is not.

This is because . . .

1 calcium is a metal but quicklime is a non-metal.

2 calcium is an element but quicklime is a compound.

3 calcium is an element but quicklime is an alloy.

4 calcium is a metal but quicklime is a carbonate.

6D The balanced equation which shows the reaction between sodium and chlorine is . . .

1 $Na + Cl_2 \rightarrow NaCl_2$

2 $2Na + Cl_2 \rightarrow Na_2Cl_2$

3 $2Na + Cl_2 \rightarrow 2NaCl$

4 $2Na + 2Cl_2 \rightarrow 2NaCl_2$

4.1.2.6 Group 7

Question 02

January 2008 | CHY1H | Original Q3 | Legacy

3 The nutrition label is from a pack of smoked salmon.

Typical values	Per 100 g	Per 50 g portion
Energy kJ kcal	695 165	350 85
Protein g Carbohydrate g of which sugars g	22.3 3.2 0.1	11.2 1.6 0.05
Fat g of which saturates g monounsaturates g polyunsaturates g	7.1 1.7 2.5 2.4	3.6 0.9 1.3 1.2
Fibre g Sodium g	0.5 1.30	0.3 0.70
Equivalent as salt g	3.2	1.6

Guideline Daily Amounts Recommended by nutrition professionals for average adults			
	Per 50 g portion	Woman	Man
Calories	85	2000	2500
Fat g	3.6	70	95
Salt g	1.6	6	6

(a) Smoked salmon is said to be a healthy food because it contains Omega 3 and other *unsaturated* fats.

(i) What does *unsaturated* mean?

.....

(1 mark)

(ii) To detect unsaturated fats, a small amount of bromine or iodine solution can be added.

What happens to show that an unsaturated fat is present?

.....

(1 mark)

(b) The amount of salt in this smoked salmon may be considered unhealthy.

Explain why it is advisable to consume only one portion of the smoked salmon per day.

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(2 marks)

4.1.2.6 Group 7

Question 02 · continued

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(c) Some farmed salmon have a coloured additive in the food that they are given. This is a permitted additive that improves the colour of the fish meat.

A sample of the colour is extracted from a salmon.

Explain how paper chromatography could be used to confirm that this is the permitted additive.

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(3 marks)

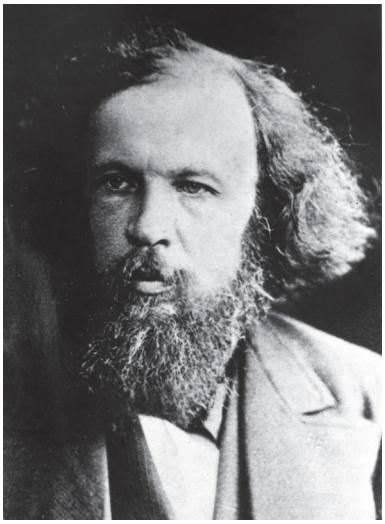
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4.1.2.6 Group 7

Question 03

January 2008 | CHY3H | Original Q4 | Legacy

4 Read the information about the periodic table.



When the Russian chemist Dimitri Mendeleev put forward his periodic table in 1869, the atomic structure of elements was unknown.

Mendeleev tried to arrange the elements in a meaningful way based on their chemical reactions. First he put the elements in order of their increasing atomic weight. He then put elements with similar properties in the same column.

However, he left gaps, and sometimes did not follow the order of increasing atomic weight – for example, he placed iodine (atomic weight 127) after tellurium (atomic weight 128).

Within a few years there was sufficient evidence to prove that Mendeleev was correct.

Our modern periodic table has evolved from Mendeleev's table.

The modern periodic table on the Data Sheet may help you to answer these questions.

(a) (i) State why Mendeleev left gaps.

.....

.....

(1 mark)

(ii) State why some elements were **not** placed in order of increasing atomic weight.

.....

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(1 mark)

4.1.2.6 Group 7

Question 03 · continued

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(b) (i) The periodic table is now based on atomic structure.

Explain how.

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(3 marks)

(ii) Suggest why it is impossible to have an undiscovered element that would fit between sodium and magnesium.

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(1 mark)

(c) Explain, in terms of electrons, why fluorine is the most reactive element in Group 7.

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(3 marks)

9

4.1.2.6 Group 7

Question 04

March 2010 | CHY1AP | Original Q1 | Legacy

QUESTION ONE

Anaesthetics are used to put patients to sleep before an operation.

Many new anaesthetics are based on alkanes in which some of the hydrogen atoms are replaced by fluorine (F), chlorine (Cl) and bromine (Br).

The temperature in an operating theatre is usually above 30 °C.

	Formula of the anaesthetic	Boiling point in °C	Additional information
A	$CF_3CHClBr$	50	Unstable in light
B	$CHF_2OCHClCF_3$	49	Very few side-effects
C	$(CF_3)_2CHOCH_2F$	59	High cost
D	$CF_3CHFOCHF_2$	24	Large amount needed to put patients to sleep

Match anaesthetics, **A**, **B**, **C** and **D**, with the numbers **1–4** below.

1 It does **not** require warming in the operating theatre to turn it into a gas.

2 It has to be stored in a dark bottle.

3 It contains the most fluorine atoms in its formula.

4 It would cause least harm to patients.

4.1.2.6 Group 7

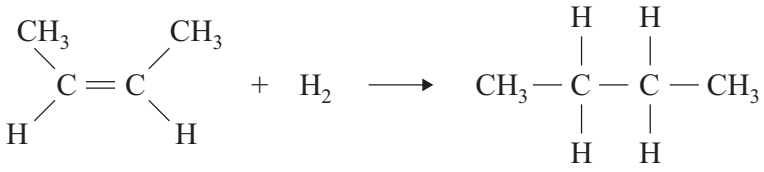
Question 05

March 2010 | CHY1BP | Original Q9 | Legacy

QUESTION NINE

Unsaturated oils contain double carbon carbon bonds. If an unsaturated hydrocarbon is heated with hydrogen gas and a nickel catalyst, the following reaction takes place.

Unsaturated hydrocarbon **Saturated hydrocarbon**



9A What is this process called?

1 cracking

2 polymerisation

3 hydrogenation

4 combustion

9B An unsaturated oil is made into a saturated compound.

The saturated compound . . .

1 contains fewer hydrogen atoms in its molecules.

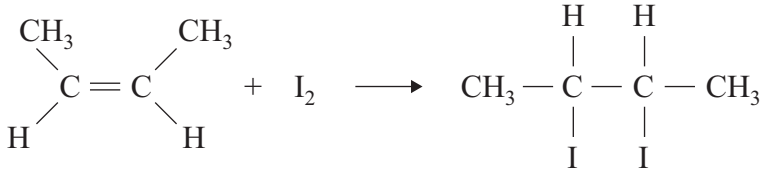
2 has a higher melting point.

3 feels softer but has the same melting point.

4 would be more useful as a fuel for vehicles.

Question 05 · continued March 2010 | CHY1BP | Original Q9 | Legacy

9C Iodine (I_2) reacts with unsaturated hydrocarbons as shown in the equation.



The iodine number is the number of grams of iodine that will react with 100 g of the unsaturated hydrocarbon. The higher the iodine number, the more unsaturated the hydrocarbon is.

3 g of iodine are added to 1 g of a vegetable oil. When the reaction has finished, 1.2 g of iodine are left unreacted.

What is the iodine number of the oil?

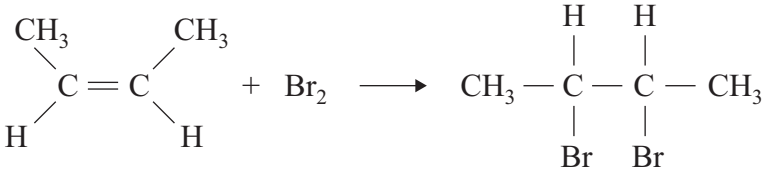
1 120

2 180

3 240

4 300

9D Bromine (Br_2) reacts with unsaturated hydrocarbons in the same way as iodine.



If bromine water is added drop-by-drop to a sample of vegetable oil, the bromine will be decolourised until all the double carbon carbon bonds have reacted.

A sample of an oil with an iodine number of 150 decolourises 25 drops of bromine water. The same amount of another vegetable oil decolourises 6 drops of the same bromine water.

What is the iodine number of the second oil?

1 30

2 36

3 40

4 45

END OF TEST

4.1.2.6 Group 7

Question 06

November 2010 | CHY1AP | Original Q9 | Legacy

QUESTION NINE

Anaesthetics are used to put people to sleep before operations.

Diethylether, $CH_3CH_2–O–CH_2CH_3$ was used as an anaesthetic. Unfortunately, diethylether is very flammable, and sunlight decomposes it into an explosive substance. Research was done to improve this anaesthetic. When halogen atoms replaced the hydrogen atoms, the compounds were much less explosive. The halogens used were fluorine (F), chlorine (Cl) and bromine (Br).

This research found the following:

- replacing the H atoms in diethylether with fluorine atoms (F) reduces the flammability
- the greater the number of different halogens, the greater the anaesthetic effect
- the more chlorine atoms, the greater the toxicity
- sunlight breaks down anaesthetics that contain C–Cl and C–Br bonds into toxic substances.

9A Which of the following is probably the most toxic anaesthetic?

1 $CH_3CHCl–O–CH_2CHCl_2$

2 $CH_3CH_2–O–CHFCFCl_2$

3 $CF_3CHCl–O–CH_2CHF_2$

4 $CF_3CH_2–O–CH_2CF_3$

9B Which of the following would probably have the greatest anaesthetic effect?

1 $CF_3CHF–O–CHClCF_3$

2 $CF_3CHCl–O–CH_2CBrF_2$

3 $CF_3CH_2–O–CH_2CCl_3$

4 $CF_3CH_2–O–CH_2CH_3$

9C Which is the only anaesthetic that would **not** have to be kept in a dark bottle?

1 $CH_3CH_2–O–CH_2CH_3$

2 $CH_3CHCl–O–CH_2CHF_2$

3 $CF_3CHF–O–CH_2CHF_2$

4 $CF_3CHCl–O–CHBrCHF_2$

4.1.2.6 Group 7

Question 06 · continued

9D When a new anaesthetic has been made, what would have to be done first before the new anaesthetic could be used on patients?

1 find the accurate boiling point

2 estimate the cost of manufacturing the new anaesthetic

3 find the dosage needed to keep patients anaesthetised

4 conduct tests on toxicity

END OF TEST

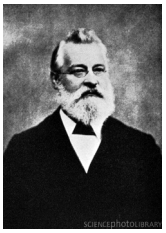
4.1.2.6 Group 7

Question 07

January 2011 | CHY3H | Original Q4 | Legacy

4 The periodic table on the Data Sheet may help you answer these questions.

4 (a) Many chemists have contributed to the development of the periodic table.



John Newlands was one of the first chemists who attempted to classify elements in a systematic way based on atomic weight. In 1866 he suggested that there was a repeating pattern of elements with similar properties every eighth element.
Part of Newlands' periodic table is shown below.

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co, Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce, La	Zr	Di, Mo	Ro, Ru

Many chemists in 1866 did not accept Newlands' periodic table.

4 (a) (i) Give **one** piece of evidence which supports Newlands' ideas.

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(1 mark)

4 (a) (ii) Suggest **two** reasons why many chemists in 1866 did not accept Newlands' ideas.

1 .....

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2 .....

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(2 marks)

4.1.2.6 Group 7

Question 07 · continued

4 (b) Chlorine, bromine and iodine are Group 7 elements.

A student investigated the reactivity of these elements.
The student added:

- aqueous chlorine to potassium bromide and potassium iodide solutions
- aqueous bromine to potassium chloride and potassium iodide solutions
- aqueous iodine to potassium chloride and potassium bromide solutions.

The student's results are shown below.

Solution	Potassium chloride	Potassium bromide	Potassium iodide
Chlorine		Solution turned orange-brown	Solution turned brown
Bromine	No reaction		Solution turned brown
Iodine	No reaction	No reaction	

4 (b) (i) Use these results to state **and** explain the trend in reactivity of these Group 7 elements.

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(2 marks)

4 (b) (ii) Complete the equation below, which represents the reaction between chlorine and potassium bromide.

Cl_2 + 2KBr ⟶ ..... + 2KCl

(1 mark)

4 (b) (iii) In terms of electronic structure, state why chlorine, bromine and iodine are in Group 7.

.....

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(1 mark)

4.1.2.6 Group 7

Question 07 · continued

4 (c) Lithium, sodium and potassium are Group 1 elements.

Group 1 elements become **more** reactive down the group.

Explain why in terms of electronic structure.

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(3 marks)

10

Turn over for the next question

4.1.2.6 Group 7

Question 08

March 2011 | CHY1AP | Original Q9 | Legacy

QUESTION NINE

Haloalkanes are alkanes which have one or more hydrogen atoms replaced by halogen atoms.

The table shows properties of some haloalkanes.

Haloalkane	Formula	Density in g per cm^3	Boiling point in °C
Chloromethane	CH_3Cl	0.916	-24.1
Bromomethane	CH_3Br	1.676	3.7
Iodomethane	CH_3I	2.279	42.5
Chloroethane	CH_3CH_2Cl	0.898	12.4
Bromoethane	CH_3CH_2Br	1.461	38.5
Iodoethane	CH_3CH_2I	1.936	72.4
Dichloromethane	CH_2Cl_2	1.30	40.1
Trichloromethane	$CHCl_3$	1.50	61.8

9A From the information in the table, increasing the length of the carbon chain . . .

1 increases density but decreases boiling point.

2 increases density and boiling point.

3 decreases density but increases boiling point.

4 decreases density and boiling point.

9B From the information in the table, replacing more hydrogen atoms with halogen atoms causes . . .

1 no effect on the boiling point or the density.

2 an increase in boiling point and density.

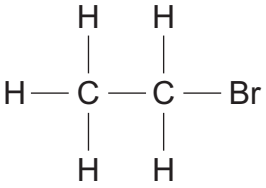
3 an increase in boiling point only.

4 an increase in density only.

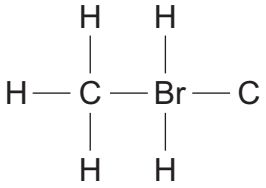
Question 08 · continued

9C Which is the correct structural formula for bromoethane?

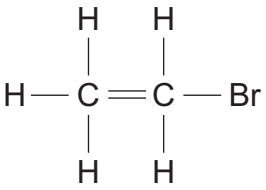
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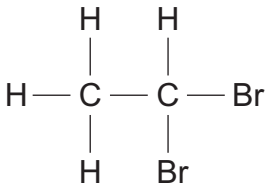
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3



4



9D The order of the halogens in Group 7 of the periodic table is shown.

Group 7
Fluorine (F)
Chlorine (Cl)
Bromine (Br)
Iodine (I)

Which row in the table below shows the properties that fluoromethane might have?

	Density in g per cm^3	Boiling point in °C
1	0.6	15
2	1.8	−100
3	1.1	−30
4	0.6	−80

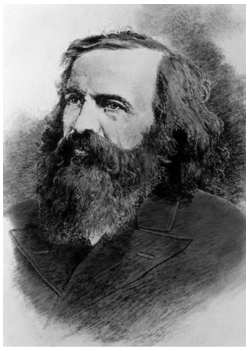
END OF TEST

4.1.2.6 Group 7

Question 09

June 2011 | CHY3H | Original Q3 | Legacy

3 Use the periodic table on the Data Sheet and the information below to help you answer these questions.



Mendeleev was one of the first chemists who classified elements in a systematic way based on atomic weight. He suggested his version of the periodic table in 1869.

He put the elements in order of their atomic weights but reversed the order for some pairs of elements. Then he arranged them in a table so that chemically similar elements were in columns known as Groups. He also left gaps and made predictions.

Part of Mendeleev's table is shown below.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl
K Cu	Ca Zn	# #	Ti #	V As	Cr Se	Mn Br
Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	# I

The gaps Mendeleev left are shown by #.

3 (a) Which group of elements in the modern periodic table is missing from Mendeleev's table?

.....

(1 mark)

4.1.2.6 Group 7

Question 09 · continued

3 (b) Mendeleev reversed the order for some pairs of elements. For example, he put tellurium (Te, atomic weight 128) before iodine (I, atomic weight 127), as shown in his table.

Why did he do this?

.....

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(1 mark)

3 (c) In 1869 many chemists did **not** agree with Mendeleev's periodic table.

Suggest **three** reasons why.

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(3 marks)

3 (d) In the 20th century, the arrangement of elements in the periodic table was explained in terms of atomic structure.

Describe the links between atomic structure and the periodic table.

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(2 marks)

7

4.1.2.6 Group 7

Question 10

June 2015 | CH1HP | Original Q1 | Legacy

1 This question is about atomic structure and elements.

1 (a) Complete the sentences.

1 (a) (i) The atomic number of an atom is the number of ..... .

[1 mark]

1 (a) (ii) The mass number of an atom is the number of .....

..... .

[1 mark]

1 (b) Explain why an atom has no overall charge.

Use the relative electrical charges of sub-atomic particles in your explanation.

[2 marks]

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1 (c) Explain why fluorine and chlorine are in the same group of the periodic table.

Give the electronic structures of fluorine and chlorine in your explanation.

[2 marks]

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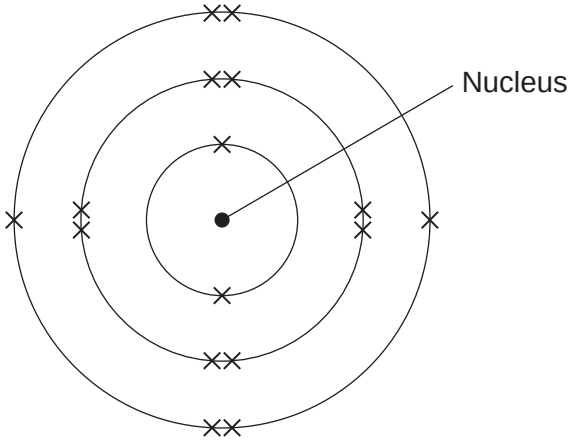
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4.1.2.6 Group 7

Question 10 · continued

1 (d) **Figure 1** shows the electronic structure of an atom of a non-metal.

Figure 1



What is the chemical symbol of this non-metal?

[1 mark]

Tick (✓) **one** box.

Ar ☐

O ☐

S ☐

Si ☐

1 (e) When elements react, their atoms join with other atoms to form compounds.

Complete the sentences.

1 (e) (i) Compounds formed when non-metals react with metals consist of

particles called ..... .

[1 mark]

1 (e) (ii) Compounds formed from only non-metals consist of

particles called ..... .

[1 mark]

9

4.1.2.6 Group 7

Question 11

3 This question is about the halogens (Group 7).

3 (a) How do the boiling points of the halogens change down the group from fluorine to iodine?

[1 mark]

.....

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3 (b) Sodium bromide is produced by reacting sodium with bromine.

Sodium bromide is an ionic compound.

3 (b) (i) Write down the symbols of the **two** ions in sodium bromide.

[1 mark]

.....

3 (b) (ii) Chlorine reacts with sodium bromide solution to produce bromine and one other product.

Complete the word equation for the reaction.

[1 mark]

chlorine + sodium bromide ⟶ bromine + ...

3 (b) (iii) Why does chlorine displace bromine from sodium bromide?

[1 mark]

.....

.....

3 (b) (iv) Use the Chemistry Data Sheet to help you to answer this question.

Suggest which halogen could react with sodium chloride solution to produce chlorine.

[1 mark]

.....

5

4.1.2.6 Group 7

Question 12

June 2016 | CH3HP | Original Q3 | Legacy

3 This question is about elements and the periodic table.

3 (a) Newlands and Mendeleev both produced early versions of the periodic table.

3 (a) (i) Complete the sentence.

[1 mark]

In their periodic tables, Newlands and Mendeleev arranged the elements in order of

_____ .

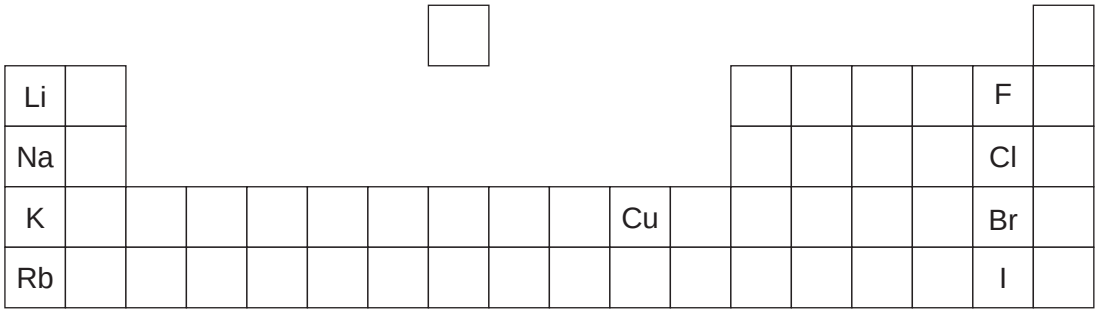
3 (a) (ii) Name the particle that allowed the elements to be arranged in order of their atomic number in the modern periodic table.

[1 mark]

_____

3 (b) **Figure 4** shows the position of nine elements in the modern periodic table.

Figure 4



3 (b) (i) Which **one** of the nine elements shown in **Figure 4** has the lowest boiling point?

[1 mark]

_____

3 (b) (ii) Copper and potassium have different melting points and boiling points.
Give **one other** difference between the properties of copper and potassium.

[1 mark]

_____

_____

4.1.2.6 Group 7

Question 12 · continued

3 (b) (iii) Explain why the reactivity of the elements increases going down Group 1 from lithium to rubidium but decreases going down Group 7 from fluorine to iodine.

[4 marks]

8

4.1.2.6 Group 7

Question 13

3 This question is about elements and compounds.

3 (a) In 1869 Mendeleev produced an early version of the periodic table.

Figure 4 shows part of Mendeleev's periodic table.

Figure 4

H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl
K	Ca		Ti	V	Cr	Mn

3 (a) (i) Why did Mendeleev leave gaps in his periodic table?

[1 mark]

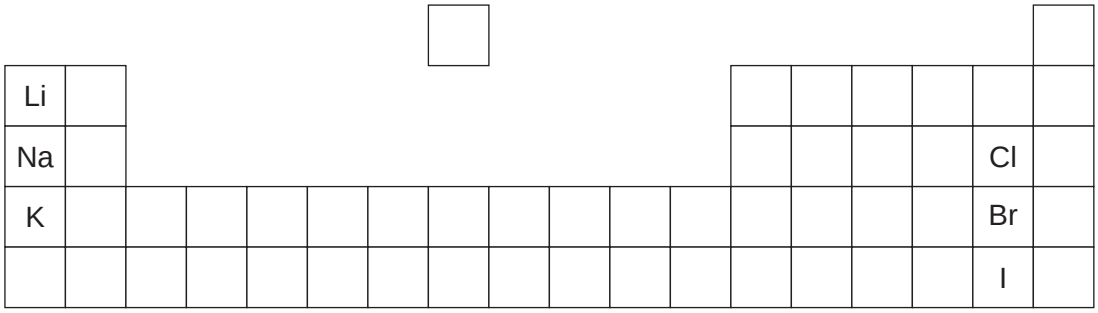
3 (a) (ii) Give **one** reason why the elements Ti, V, Cr and Mn should **not** be where Mendeleev placed them.

[1 mark]

Question 13 · continued

3 (b) **Figure 5** shows an outline of the modern periodic table.

Figure 5



3 (b) (i) Why, in terms of electrons, is bromine in Group 7?

[1 mark]

3 (b) (ii) Bromine reacts with sodium iodide.

The word equation for the reaction is:

bromine + sodium iodide ⟶ sodium bromide + iodine

This reaction shows that bromine is more reactive than iodine.

Explain why, in terms of electrons.

[3 marks]

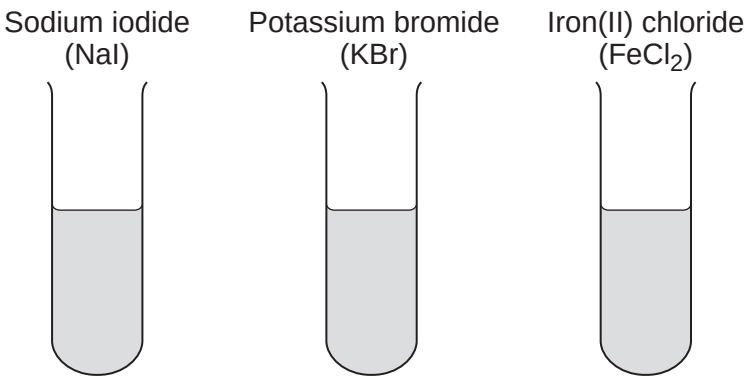
Question 3 continues on the next page

4.1.2.6 Group 7

Question 13 · continued

3 (c) **Figure 6** shows test tubes containing solutions of sodium iodide, potassium bromide and iron(II) chloride.

Figure 6



3 (c) (i) A student tested each solution with silver nitrate in the presence of dilute nitric acid.

Write the result for sodium iodide solution in **Table 1**.

[1 mark]

Table 1

	Sodium iodide solution	**Potassium bromide solution**	**Iron(II) chloride solution**
Result of adding silver nitrate		Cream precipitate	White precipitate

3 (c) (ii) The student tested new samples of each solution with sodium hydroxide solution.

Write the result for iron(II) chloride solution in **Table 2**.

[1 mark]

Table 2

	Sodium iodide solution	**Potassium bromide solution**	**Iron(II) chloride solution**
Result of adding sodium hydroxide solution	No precipitate	No precipitate	

4.1.2.6 Group 7

Question 13 · continued

3 (d) A flame test is done on a mixture of sodium iodide and potassium bromide.

Why would a flame test **not** show the presence of both sodium ions and potassium ions in the mixture?

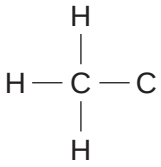
[1 mark]

3 (e) Carboxylic acids are compounds containing carbon.

3 (e) (i) Complete **Figure 7** to show the displayed structure of ethanoic acid.

[1 mark]

Figure 7



3 (e) (ii) Explain why ethanoic acid has a higher pH value than hydrochloric acid of the same concentration.

[2 marks]

12

4.1.2.6 Group 7

Question 14

June 2018 | 8462/1H | Original Q7

0 7 This question is about Group 7 elements.

Chlorine is more reactive than iodine.

0 7 . 1 Name the products formed when chlorine solution reacts with potassium iodide solution.

[1 mark]

0 7 . 2 Explain why chlorine is more reactive than iodine.

[3 marks]

0 7 . 3 Chlorine reacts with hydrogen to form hydrogen chloride.

Explain why hydrogen chloride is a gas at room temperature.

Answer in terms of structure and bonding.

[3 marks]

0 7 . 4 Bromine reacts with methane in sunlight.

Figure 9 shows the displayed formulae for the reaction of bromine with methane.

Figure 9

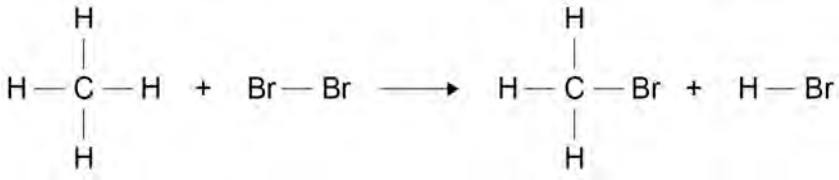


Table 3 shows the bond energies and the overall energy change in the reaction.

Table 3

	C—H	**Br—Br**	**C—Br**	**H—Br**	**Overall energy change**
Energy in kJ/mol	412	193	**X**	366	– 51

Calculate the bond energy **X** for the C—Br bond.

Use **Figure 9** and **Table 3**.

[4 marks]

Bond energy **X** = _____ kJ/mol

1

4.1.2.6 Group 7

Question 15

0 1 This question is about the periodic table.

In the 19th century, some scientists tried to classify the elements by arranging them in order of their atomic weights.

Figure 1 shows the periodic table Mendeleev produced in 1869.

His periodic table was more widely accepted than previous versions.

Figure 1

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Period 1	H						
Period 2	Li	Be	B	C	N	O	F
Period 3	Na	Mg	Al	Si	P	S	Cl
Period 4	K Cu	Ca Zn	* *	Ti *	V As	Cr Se	Mn Br
Period 5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	* I

0 1 . 1 The atomic weight of tellurium (Te) is 128 and that of iodine (I) is 127

Why did Mendeleev reverse the order of these two elements?

[1 mark]

4.1.2.6 Group 7

Question 15 · continued

0 1 . 2 Mendeleev left spaces marked with an asterisk *

He left these spaces because he thought missing elements belonged there.

Why did Mendeleev's periodic table become more widely accepted than previous versions?

[3 marks]

0 1 . 3 Mendeleev arranged the elements in order of their atomic weight.

What is the modern name for atomic weight?

[1 mark]

Tick (✓) **one** box.

- Atomic number ☐
- Mass number ☐
- Relative atomic mass ☐
- Relative formula mass ☐

0 1 . 4 Complete the sentence.

[1 mark]

In the modern periodic table, the elements are arranged in order of

_____.

4.1.2.6 Group 7

Question 15 · continued

Chlorine, iodine and astatine are in Group 7 of the modern periodic table.

0 1 . 5 Astatine (At) is below iodine in Group 7.

Predict:

- the formula of an astatine molecule
- the state of astatine at room temperature.

[2 marks]

Formula of astatine molecule _____

State at room temperature _____

0 1 . 6 Sodium is in Group 1 of the modern periodic table.

Describe what you would see when sodium reacts with chlorine.

[2 marks]

_____

_____

_____

_____

10

4.1.2.6 Group 7

Question 16

November 2020 | 8462/1H | Original Q8

0 8 This question is about the halogens.

Table 5 shows the melting points and boiling points of some halogens.

Table 5

Element	Melting point in °C	Boiling point in °C
Fluorine	–220	–188
Chlorine	–101	–35
Bromine	–7	59

0 8 . 1 What is the state of bromine at 0 °C **and** at 100 °C?

[1 mark]

Tick (✓) **one** box.

State at 0 °C	State at 100 °C	
Gas	Gas	☐
Gas	Liquid	☐
Liquid	Gas	☐
Liquid	Liquid	☐
Solid	Gas	☐
Solid	Liquid	☐

4.1.2.6 Group 7

Question 16 · continued

0 8 . 2 Explain the trend in boiling points of the halogens shown in **Table 5**.

[4 marks]

0 8 . 3 Why is it **not** correct to say that the boiling point of a single bromine molecule is 59 °C?

[1 mark]

Question 8 continues on the next page

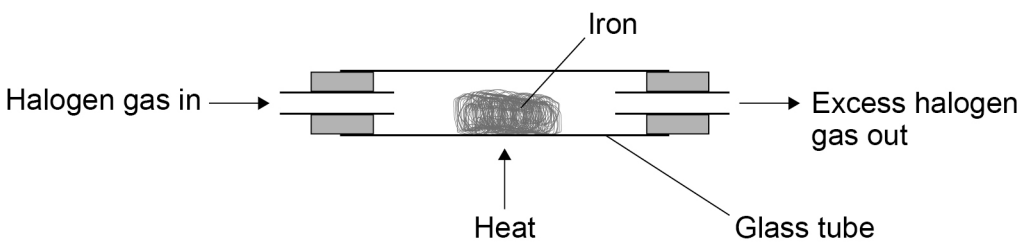
4.1.2.6 Group 7

Question 16 · continued

Iron reacts with each of the halogens in their gaseous form.

Figure 5 shows the apparatus used.

Figure 5



0 8 . 4 Give **one** reason why this experiment should be done in a fume cupboard.

[1 mark]

0 8 . 5 Explain why the reactivity of the halogens decreases going down the group.

[3 marks]

4.1.2.6 Group 7

Question 16 · continued

0 8 . 6 A teacher investigated the reaction of iron with chlorine using the apparatus in **Figure 5**.

The word equation for the reaction is:

iron + chlorine → iron chloride

The teacher weighed:

- the glass tube
- the glass tube and iron before the reaction
- the glass tube and iron chloride after the reaction.

Table 6 shows the teacher's results.

Table 6

	Mass in g
Glass tube	51.56
Glass tube and iron	56.04
Glass tube and iron chloride	64.56

Calculate the simplest whole number ratio of:

moles of iron atoms : moles of chlorine atoms

Determine the balanced equation for the reaction.

Relative atomic masses (A_r): Cl = 35.5 Fe = 56

[6 marks]

Moles of iron atoms : moles of chlorine atoms = _____ : _____

Equation for the reaction _____

16

4.1.2.6 Group 7

Question 17

0 2 This question is about the periodic table.

Sodium and potassium are in Group 1 of the periodic table.

0 2 . 1 Give **one** similarity and **one** difference between the electronic structures of sodium and potassium.

[2 marks]

Similarity _____

_____

Difference _____

_____

Group 1 elements react with water.

0 2 . 2 Give **two** observations made when potassium reacts with water.

[2 marks]

1 _____

_____

2 _____

_____

0 2 . 3 Potassium hydroxide solution is produced when potassium reacts with water.

What is the colour of universal indicator when added to potassium hydroxide solution?

Give **one** reason for your answer.

[2 marks]

Colour of universal indicator _____

Reason _____

_____

4.1.2.6 Group 7

Question 17 · continued

Table 1 shows the densities of some of the elements in Group 0 of the periodic table.

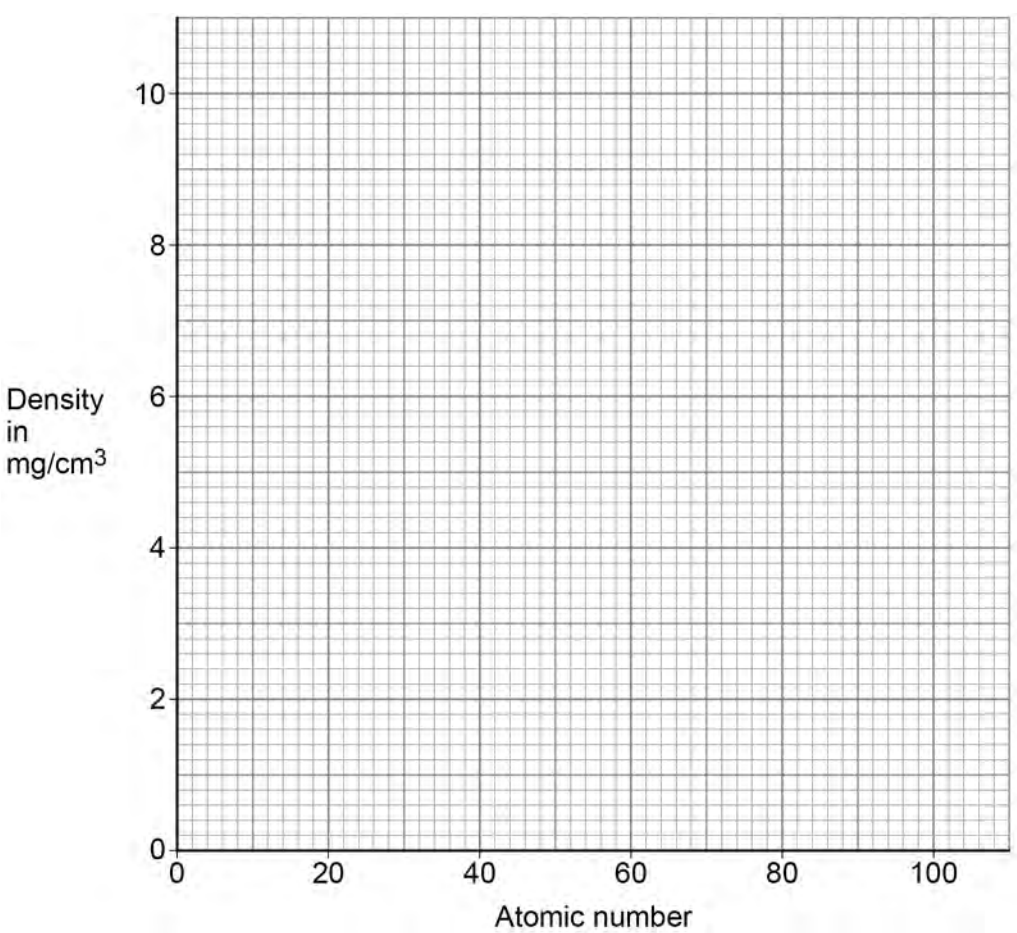
Table 1

Element	Atomic number	Density in mg/cm^3
Helium	2	0.2
Neon	10	0.8
Argon	18	1.6
Krypton	36	**X**
Xenon	54	5.4
Radon	86	9.1

0 2 . 4 Plot the data from **Table 1** on **Figure 1**.

[2 marks]

Figure 1



Question 17 · continued

0 2 . 5 Estimate the density (**X**) of krypton.

Use **Figure 1** and **Table 1**.

[1 mark]

Density = _____ mg/cm^3

0 2 . 6 The elements in Group 7 are called the halogens.

A more reactive halogen can displace a less reactive halogen from a solution of its salt.

Which combination of solutions will produce a reaction when mixed?

[1 mark]

Tick (✓) **one** box.

- Chlorine and potassium fluoride ☐
- Chlorine and potassium bromide ☐
- Bromine and potassium fluoride ☐
- Bromine and potassium chloride ☐

0 2 . 7 Which of the following describes the trends going down Group 7?

[1 mark]

Tick (✓) **one** box.

- Relative molecular mass decreases and boiling point decreases. ☐
- Relative molecular mass decreases and boiling point increases. ☐
- Relative molecular mass increases and boiling point decreases. ☐
- Relative molecular mass increases and boiling point increases. ☐

11

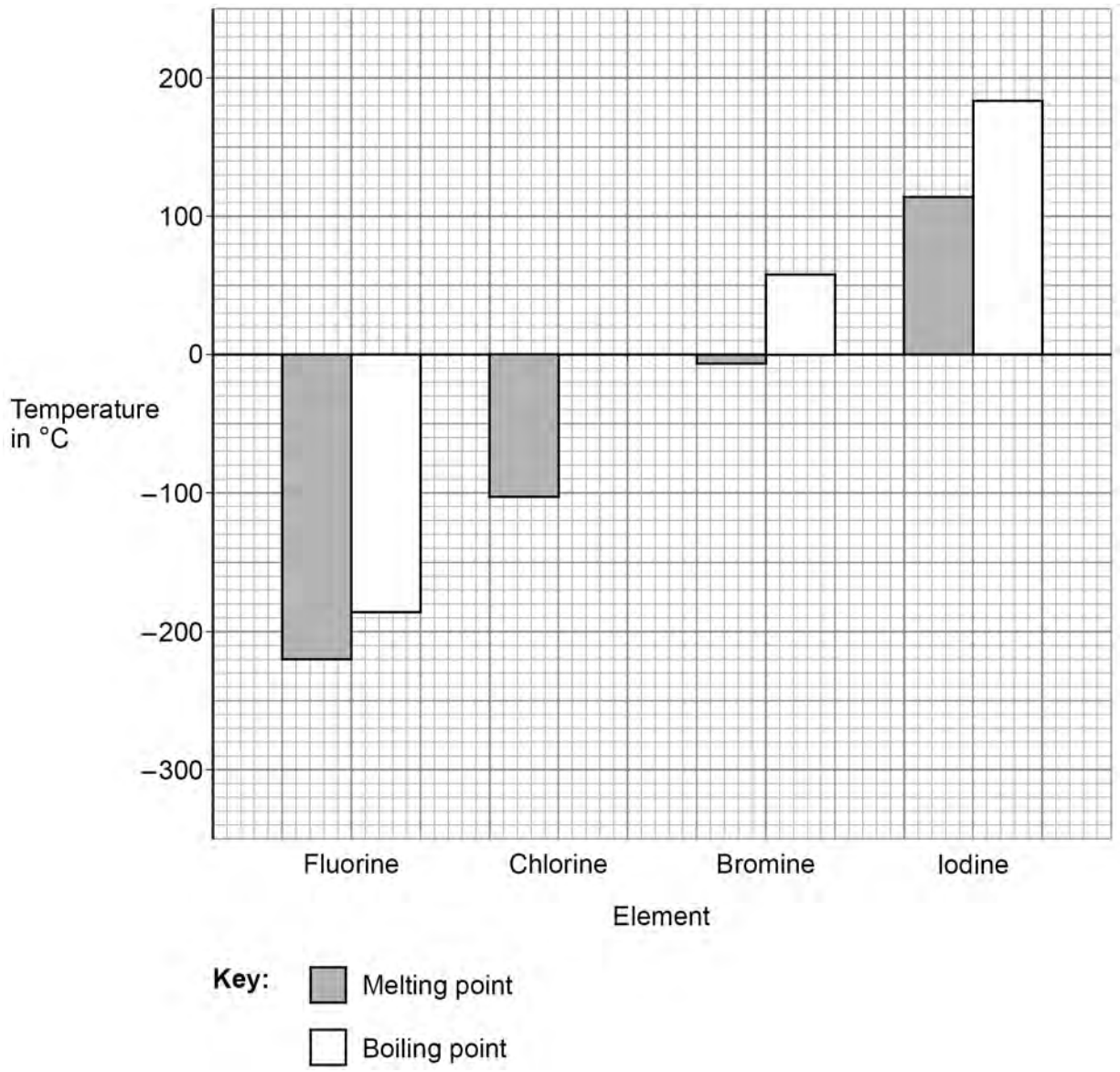
4.1.2.6 Group 7

Question 18

0 4 The elements in Group 7 of the periodic table are known as the halogens.

Figure 4 shows information about some of the elements in Group 7.

Figure 4



4.1.2.6 Group 7

Question 18 · continued

0 4 . 1 Predict the boiling point of chlorine.

Use **Figure 4**.

[1 mark]

_____ °C

0 4 . 2 What is the state of fluorine at –250 °C?

Use **Figure 4**.

[1 mark]

_____

Astatine (At) is an element in Group 7.

0 4 . 3 What is the number of electrons in the outer shell of an astatine atom?

[1 mark]

_____

0 4 . 4 Hydrogen reacts with astatine to produce hydrogen astatide.

Predict the formula of hydrogen astatide.

[1 mark]

_____

Question 4 continues on the next page

4.1.2.6 Group 7

Question 18 · continued

0 4 . 5 Explain the trend in reactivity of the elements going down Group 7.

[4 marks]

Extra space

0 4 . 6 A more reactive halogen can displace a less reactive halogen from a solution of its salt.

Write a balanced equation for the reaction between bromine and potassium iodide.

[3 marks]

_____ + _____ ⟶ _____ + _____

11