PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 6: GROUPS IN THE PERIODIC TABLE: GROUP 7 (PAPER 2)

SCORE	PERCENTAGE
/129	%

STEMUP

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Q1.

Acids

(a) Magnesium carbonate reacts with dilute nitric acid.

Give the names of the products formed in this reaction.

(2)

.....

(b) Zinc oxide, ZnO, reacts with dilute hydrochloric acid to form zinc chloride, $ZnCl_2$, and water.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

This reaction is an example of

(1)

☒ **A** combustion

☒ **B** thermal decomposition

☒ **C** neutralisation

☒ **D** oxidation

(ii) Write the balanced equation for the reaction between zinc oxide and dilute hydrochloric acid.

(3)

.....

*(c) Electrolysis of hydrochloric acid can produce hydrogen and chlorine.

The apparatus for the electrolysis is

hydrochloric acid

two carbon rods

a suitable container for the electrolysis reaction

a suitable source of electricity

test tubes

Describe how the apparatus can be used to electrolyse hydrochloric acid and how the gases produced can be tested to show that they are hydrogen and chlorine.

You may use a diagram to help your answer.

(6)

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(Total for question = 12 marks)

(**Q10 1SC0/2CH, June 2014**)

Q2.

The word equation for the reaction of potassium with bromine is

potassium + bromine → potassium bromide

Add the missing state symbol and balance the equation for this reaction.

(2)

..... K(.....) + Br_2(g) → ..... KBr(s)

(Total for question = 2 marks)

(**QU02c 1SC0/2CH, June 2023**)

Q3.

The word equation for the reaction of potassium with bromine is

potassium + bromine → potassium bromide

Add the missing state symbol and balance the equation for this reaction.

(2)

..... K(.....) + Br_2(g) → ..... KBr(s)

(Total for question = 2 marks)

(**QU06c 1SC0/2CF, June 2023**)

Q4.

This question is about bromine.

Bromine reacts with hydrogen to form hydrogen bromide.

(i) Write the word equation for this reaction.

(2)

..... + ... → .....

(ii) Hydrogen bromide dissolves in water to form a solution.

This solution of hydrogen bromide reacts with alkalis.

State the type of reaction that occurs when a solution of hydrogen bromide reacts with an alkali.

(1)

.....

.....

(Total for question = 3 marks)

(**QU04b 1SC0/2CF, June 2024**)

Q5.

The elements in group 7 of the periodic table are the halogens.

* (i) The order of reactivity of the halogens can be found by displacement reactions.

A student was provided with

- solutions of bromine, chlorine and iodine
- solutions of sodium bromide, sodium chloride and sodium iodide.

Describe experiments the student could carry out using these solutions to find the order of reactivity of bromine, chlorine and iodine, explaining how the results would show the order of reactivity.

You should use equations to support your answer.

(6)

(ii) Explain why the displacement reactions of halogens are redox reactions.

(2)

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(Total for question = 8 marks)

(**QU06d 1SC0/2CH, June 2024**)

Q6.

Sodium reacts with fluorine to form sodium fluoride, NaF.

Complete the balanced equation for this reaction.

(2)

$$2Na + \text{.....} \rightarrow \text{.....}NaF$$

(Total for question = 2 marks)

(**Q05c 1SC0/2CF/S2, SAM**)

Q7.

Sodium reacts with fluorine to form sodium fluoride, NaF.

Complete the balanced equation for this reaction.

(2)

$$2Na + \text{.....} \rightarrow \text{.....}NaF$$

(Total for question = 2 marks)

(**Q01c 1SC0/2CH/S2, SAM**)

Q8.

Tin reacts with chlorine to form tin chloride.
A sample of tin chloride contains 1.19 g of tin and 1.42 g of chlorine.

Calculate the empirical formula of this tin chloride.

(relative atomic masses: Cl = 35.5, Sn = 119.0)

You must show your working.

(3)

.....

.....

.....

.....

empirical formula of this tin chloride = ...

(Total for question = 3 marks)

(**Q03b 1SC0/2CF, Nov 2021**)

Q9.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about gases.

Some damp litmus paper is placed in a gas.
The litmus paper is bleached.

Which gas bleaches damp litmus paper?

(1)

☒ **A** carbon dioxide

☒ **B** chlorine

☒ **C** hydrogen

☒ **D** oxygen

(Total for question = 1 mark)

(**QU02b 1SC0/2CH, June 2022**)

Q10.

This question is about bromine.

Potassium bromide contains 32.8% potassium by mass.

Calculate the mass of potassium and the mass of bromine in 500 g potassium bromide.

(3)

.....

.....

.....

.....

mass of potassium = ... g

mass of bromine = ... g

(Total for question = 3 marks)

(**QU04d 1SC0/2CF, June 2024**)

Q11.

Chlorine is a halogen.

Chlorine reacts with potassium iodide solution to form potassium chloride solution and iodine.

$$Cl_2 + 2KI \rightarrow 2KCl + I_2$$

(i) State what would be **seen** when this reaction occurs.

(1)

.....

.....

(ii) Write the ionic equation for this reaction.

(3)

.....

(iii) Explain, in terms of their electronic configurations, why chlorine is more reactive than iodine.

(2)

.....

.....

.....

(iv) Explain why this reaction is an example of a redox reaction.

(4)

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(Total for question = 10 marks)

(**Q05b 1SC0/2CH/S2, SAM**)

Q12.

Chlorine reacts with potassium iodide to form iodine and potassium chloride.

Complete the word equation for the reaction between bromine and potassium astatide.

(2)

bromine + potassium astatide → +

(Total for question = 2 marks)

(**Q02c 1SC0/2CF, SAM 2016**)

Q13.

Potassium reacts with fluorine to form potassium fluoride.
Potassium fluoride is a solid.

Complete the balanced equation for this reaction and add the state symbols.

(3)

.....K (.....) + F_2(g) → .....KF (.....)

(Total for question = 3 marks)

(**Q05d 1SC0/2CF, Nov 2020**)

Q14.

Potassium reacts with fluorine to form potassium fluoride.
Potassium fluoride is a solid.

Complete the balanced equation for this reaction and add the state symbols.

(3)

.....K (.....) + F_2(g) → .....KF (.....)

(Total for question = 3 marks)

Q15.

Compounds

(a) (i) Balance the equation for the reaction between sodium and chlorine to produce sodium chloride by putting numbers in the spaces provided.

(2)

..... Na + Cl_2 → ..... NaCl

(ii) In an experiment to make sodium chloride, the yield is 2.5 g.
The theoretical yield of sodium chloride for this experiment is 4.0 g.

Calculate the percentage yield of sodium chloride in this experiment.

(2)

.....

.....

.....

percentage yield = ... %

(iii) Sodium chloride has a high melting point.
Sodium chloride does not conduct electricity when solid but does conduct electricity when molten.

Complete the sentence by putting a cross (☒) in the box next to your answer.

These properties show that the structure of sodium chloride is

(1)

☒ **A** ionic

☒ **B** giant molecular, covalent

☒ **C** simple molecular, covalent

☒ **D** metallic

(iv) Calculate the relative formula mass of sodium chloride, NaCl. (relative atomic masses: Na = 23, Cl = 35.5)

(1)

.....

relative formula mass = ...

(b) Calculate the percentage by mass of magnesium in magnesium sulfate, $MgSO_4$.

(relative atomic masses: O = 16, Mg = 24, S = 32

relative formula mass: $MgSO_4$ = 120)

(2)

.....

.....

.....

percentage of magnesium = ... %

(c) The formula of a molecule of ethane is C_2H_6.

(i) Give the empirical formula of ethane.

(1)

.....

(ii) Ethane is a simple molecular, covalent compound.

Ethane has a low boiling point.

Explain, in terms of particles it contains, why ethane has a low boiling point.

(2)

.....

.....

.....

.....

(Total for question = 11 marks)

(**Q04 1SC0/2CF, June 2014**)

Q16.

The elements in group 7 of the periodic table are called the halogens.

Figure 1 shows the atomic number and boiling point of some of the halogens.

halogen	atomic number	boiling point in °C
fluorine	9	–188
chlorine	17	–35
bromine	35	59
iodine	53	

Figure 1

(i) Describe the trend in the boiling points of the first three halogens in Figure 1.

(2)

.....

.....

(ii) Using the information in Figure 1, predict the boiling point of iodine.

Write your prediction on the answer line below.

(1)

boiling point of iodine = ... °C

(Total for question = 3 marks)

(**QU01c 1SC0/2CF, June 2025**)

Q17.

Fluorine, chlorine, bromine, iodine and astatine are elements in group 7.

Describe the test to show that a gas is chlorine.

(2)

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.....

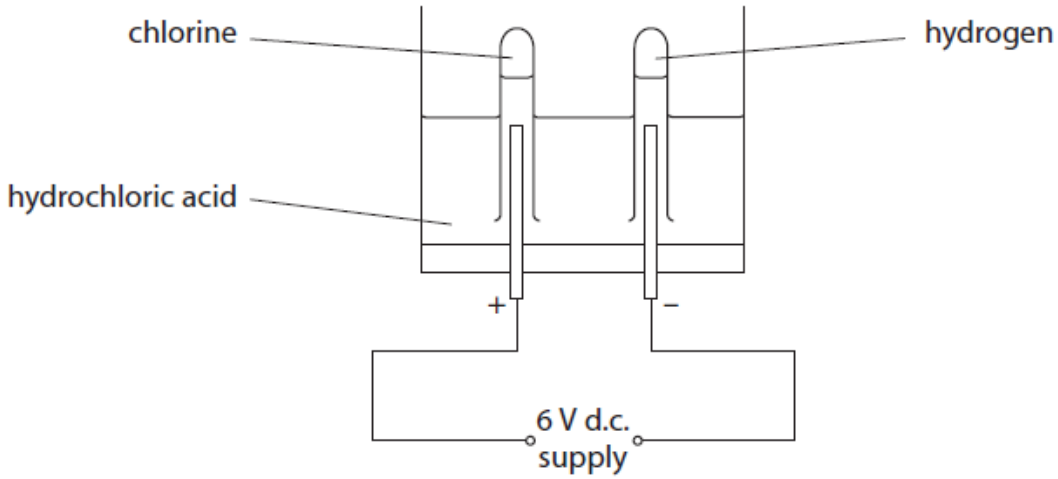
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(Total for question = 2 marks)

(**Q06a 1SC0/2CH, June 2019**)

Q18.

Hydrochloric acid can be used to make chlorine in the apparatus shown.



(i) The experiment shown is an example of electrolysis.

Explain the meaning of **electrolysis**.

(2)

.....

.....

.....

(ii) Describe the test to show a gas is chlorine.

(2)

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(iii) Great care has to be taken when chlorine is manufactured on a large scale.

Explain the potential hazards of storing large volumes of chlorine.

(2)

.....

.....

.....

(iv) State a large-scale use of chlorine.

(1)

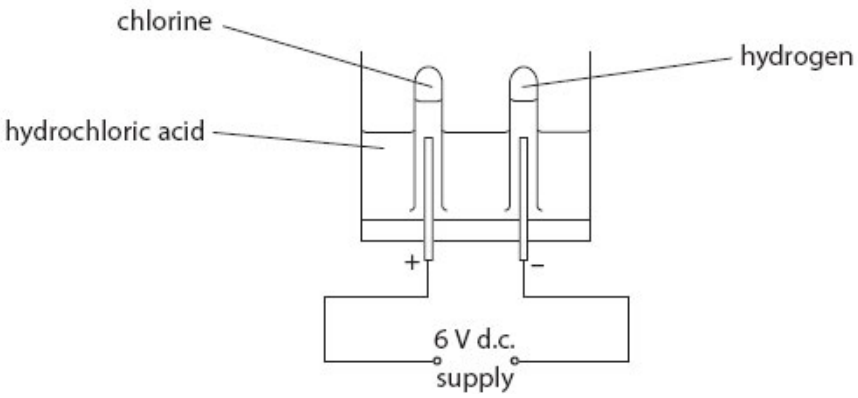
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(**Q20 1SC0/2CF, June 2015**)

Q19.

Electrolysis of hydrochloric acid produces chlorine and hydrogen.

The apparatus used is shown.



(i) Explain what is meant by **electrolysis.**

(2)

.....

.....

(ii) Describe the test to show that a gas is chlorine.

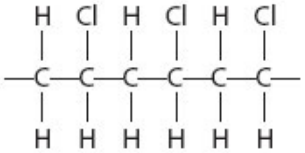
(2)

.....

.....

.....

(iii) Chlorine is used in the manufacture of a polymer.
Part of this polymer molecule is



State the name of the polymer.

(1)

.....

(**Q25 1SC0/2CH, June 2013**)

Q20.

Elements in the periodic table

(a) Copper is a metal.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

In the periodic table copper is in

(1)

☒ **A** group 0

☒ **B** group 1

☒ **C** group 7

☒ **D** the transition metals

(ii) Which of these is a property of copper metal?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** does not conduct an electric current

☒ **B** forms colourless compounds

☒ **C** has a low melting point

☒ **D** is malleable

(b) Helium and argon are noble gases.

(i) Choose the correct word from this box to complete the sentence below.

non- flammable	odourless	reactive

(1)

Argon can be used to put out fires because it is .....

(ii) Choose the correct phrase from this box to complete the sentence below.

has a high density	has a low density	is colourless



(1)

Helium is used in airships because it .....

(c) Chlorine, bromine and iodine are halogens.

(i) The table shows the appearance of bromine and iodine at room temperature.

Complete the table to show the appearance of chlorine at room temperature.

(2)

halogen	appearance at room temperature
chlorine	
bromine	dark red liquid
iodine	grey solid

(ii) Chlorine reacts with hydrogen to form hydrogen chloride.

Write the word equation for this reaction.

(2)

..... + ... → .....

(Total for question = 8 marks)

(**Q01 1SC0/2CF, June 2014**)

Q21.

Aluminium reacts with chlorine to form aluminium chloride.

Write the balanced equation for this reaction.

(3)

.....

(Total for question = 3 marks)

(**Q18 1SC0/2CH, June 2018**)

Q22.

Figure 4 shows information about some of the elements in group 7 of the periodic table.

element	melting point / °C	boiling point / °C
fluorine	–220	–188
chlorine	–101	–35
bromine	7	59
iodine	114	184

Figure 4

Astatine is below iodine in group 7 of the periodic table.

Estimate the boiling point of astatine.

(1)

boiling point of astatine = ... °C

(Total for question = 1 mark)

(**Q02b 1SC0/2CF, SAM 2016**)

Q23.

* The order of reactivity of chlorine, bromine and iodine can be determined by carrying out displacement reactions.

Explain how displacement reactions can be used to show the reactivity of these three elements.

(6)

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(Total for question = 6 marks)

(**Q05b 1SC0/2CH, SAM 2016**)

Q24.

Bromine, chlorine and iodine are dissolved in water to make aqueous solutions.
Potassium iodide solution is added to each of these solutions.

Figure 5 shows the observations.

halogen	initial colour of aqueous solution	final colour of mixture
bromine	orange	brown
chlorine	pale green	brown
iodine	brown	brown

Figure 5

Explain the observations shown in the table.

(4)

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(Total for question = 4 marks)

(**Q06d 1SC0/2CH, June 2019**)

Q25.

When iron reacts with bromine, bromide ions are formed.

Explain the type of reaction bromine atoms undergo when they are converted to bromide ions.

(2)

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.....

.....

.....

(Total for question = 2 marks)

(**Q05cii 1SC0/2CH, SAM 2016**)

Q26.

This question is about molecules containing two atoms.

Iodine reacts with hydrogen to form hydrogen iodide, HI.

Explain whether or not a solution of hydrogen iodide in water conducts electricity.

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(Total for question = 2 marks)

(**QU06c 1SC0/2CH, June 2025**)

Q27.

Explain why chlorine is more reactive than iodine.

(3)

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(Total for question = 3 marks)

(**QU04b 1SC0/2CH, June 2022**)

Q28.

Tin also reacts with fluorine.
The reaction between fluorine and tin is much more vigorous than the reaction between chlorine and tin.

Figure 4 shows the electronic configurations of fluorine and chlorine.

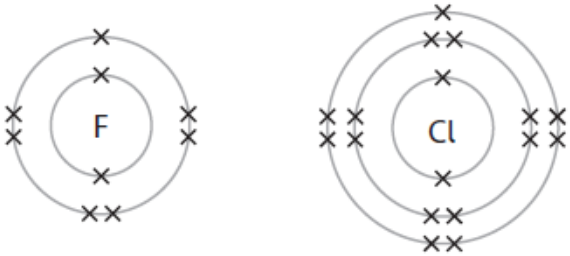


Figure 4

Explain, in terms of their electronic configurations, why fluorine reacts with tin more vigorously than chlorine reacts with tin.

(2)

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.....

(Total for question = 2 marks)

(**Q03c 1SC0/2CF, Nov 2021**)

Q29.

If chlorine solution is added to sodium bromide solution a reaction occurs.

chlorine + sodium bromide → sodium chloride + bromine

Give a reason why this reaction occurs.

(1)

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.....

(Total for question = 1 mark)

(**Q03c 1SC0/2CF, Nov 2020**)

Q30.

Figure 9 shows the melting points and boiling points of elements in group 7 of the periodic table.

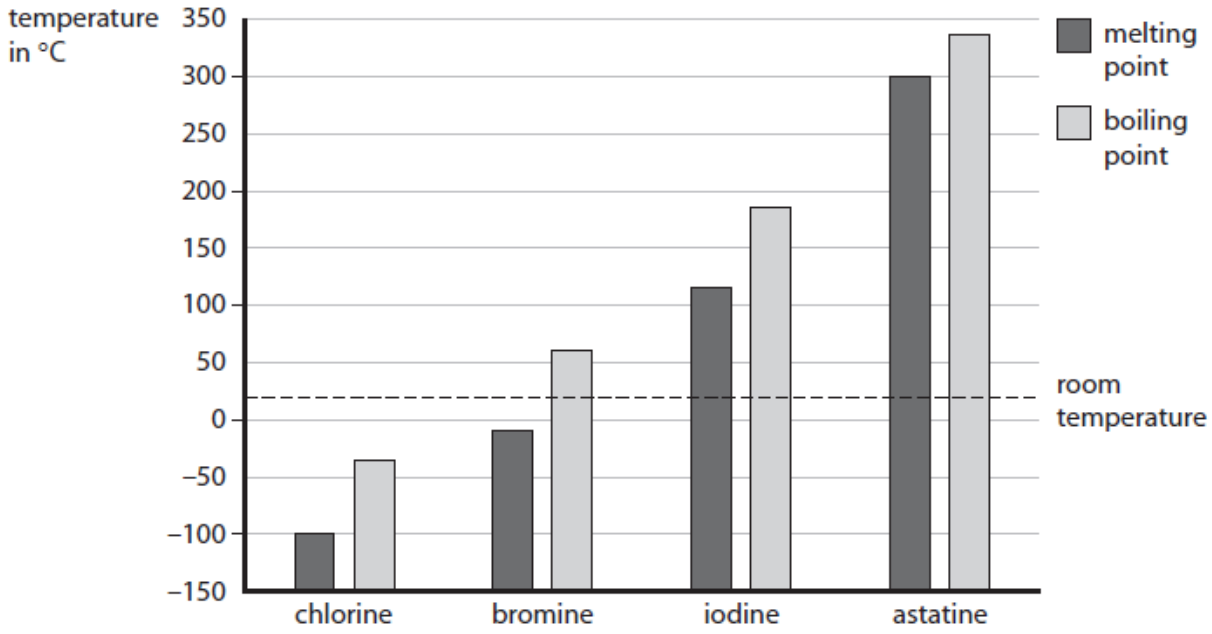


Figure 9

(i) Give, using Figure 9, the boiling point of bromine.

(1)

boiling point of bromine = ... °C

(ii) State which **two** elements from Figure 9 are solids at room temperature.

(1)

.....

(Total for question = 2 marks)

(**Q05f 1SC0/2CF, Nov 2020**)

Q31.

Sodium iodide solution is colourless.

When a solution of bromine is added to sodium iodide solution, a reaction occurs.

$$2NaI + Br_2 \rightarrow 2NaBr + I_2$$

(i) The mixture turns brown.

Give the name of the substance causing the brown colour.

(1)

.....

(ii) Explain which substance has been reduced in this reaction.

(2)

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.....

(Total for question = 3 marks)

(**Q03b 1SC0/2CH, Nov 2020**)

Q32.

This question is about molecules containing two atoms.

Chlorine gas is bubbled through a colourless solution of potassium bromide, KBr.
The mixture turns orange.

(i) Give the name of the substance that causes the orange colour.

(1)

.....

(ii) Write the balanced equation for this reaction

(3)

.....

.....

(Total for question = 4 marks)

(**QU06d 1SC0/2CH, June 2025**)

Q33.

Group 7 elements

(a) A compound of iron and chlorine was formed by reacting 2.80 g of iron with 3.55 g of chlorine.

Calculate the empirical formula of the compound.
(relative atomic masses: Cl = 35.5, Fe = 56.0)

(3)

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.....

empirical formula .....

(b) Sodium reacts with chlorine to form sodium chloride.

$$2Na + Cl_2 \rightarrow 2NaCl$$

Calculate the maximum mass of sodium chloride that could be formed by reacting 9.20 g of sodium with excess chlorine.
(relative atomic masses: Na = 23.0, Cl = 35.5)

(3)

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.....

.....

mass of sodium chloride ..... g

*(c) Chlorine, bromine and iodine are in group 7 of the periodic table.

The order of reactivity of these three elements can be shown by carrying out displacement experiments.

You are provided with

potassium bromide solution
potassium chloride solution
potassium iodide solution
bromine solution
chlorine solution
iodine solution

Describe how these solutions could be used to carry out experiments to show the order of reactivity of bromine, chlorine and iodine, explaining how the results would show the order of reactivity.
You may use equations if you wish.

(6)

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(Total for question = 12 marks)

(**Q06 1SC0/2CH, June 2014**)

Q34.

The periodic table is very useful to chemists.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

The periodic table is a table of

(1)

☒ **A** mixtures

☒ **B** elements

☒ **C** compounds

☒ **D** solutions

(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

Group 1 in the periodic table contains

(1)

☒ **A** transition metals

☒ **B** noble gases

☒ **C** halogens

☒ **D** alkali metals

(c) The table shows some of the gases in group 0 and some of their properties.
The gases are shown in the order in which they appear in group 0.

(i) Fill in the three spaces in the table.

gas	atomic symbol	density / g dm^{-3}	reaction with metals
helium	He	0.12	no reaction
neon	Ne	1.44	no reaction
argon	Ar		no reaction
krypton		3.00	no reaction
xenon	Xe	3.56	

(ii) Some light bulbs contain a metal filament.



These light bulbs are filled with argon.

Explain why argon, instead of air, is used inside these light bulbs.

(2)

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.....

.....

(d) The table shows some solids and some properties of solids.

Draw **one** straight line from each solid to properties of that solid.

solid	properties of solid
iodine	a soft metal that reacts vigorously with water
potassium	a grey solid that forms a purple vapour when heated
copper	a yellow solid that does not conduct electricity
	a red-brown solid that reacts to form blue compounds

(Total for Question = 9 marks)

(**Q01 1SC0/2CF, June 2013**)

Q35.

These two hazard symbols are attached to a container of liquid bromine.





A chemist uses bromine in an experiment.

Use the hazard symbols to suggest safety precautions the chemist should take when using the bromine.

(2)

.....

.....

.....

(**Q02 1SC0/2CF, June 2015**)

Q36.

The table gives information about the colours and physical states at room temperature of the halogens, chlorine, bromine and iodine.

Complete the table.

(3)

name	colour at room temperature	physical state at room temperature
chlorine		gas
bromine		liquid
iodine	grey	

(**Q01 1SC0/2CF, June 2015**)

Q37.

Magnesium reacts with bromine to form magnesium bromide.

Write the word equation for this reaction.

(2)

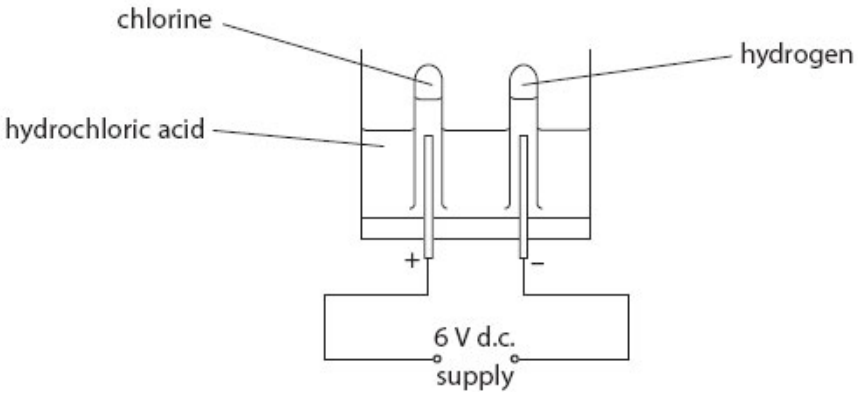
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(**Q03 1SC0/2CF, June 2015**)

Q38.

(a) Electrolysis of hydrochloric acid produces chlorine and hydrogen.

The apparatus used is shown.



(i) Explain what is meant by **electrolysis.**

(2)

.....

.....

(ii) Describe the test to show that a gas is chlorine.

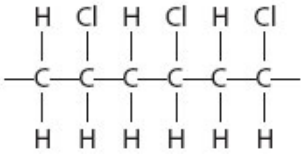
(2)

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.....

.....

(iii) Chlorine is used in the manufacture of a polymer.
Part of this polymer molecule is



State the name of the polymer.

(1)

.....

(b) Dilute hydrochloric acid reacts with silver nitrate solution to form silver chloride and nitric acid.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The reaction produces silver chloride as a precipitate.

In an equation this would be shown as

(1)

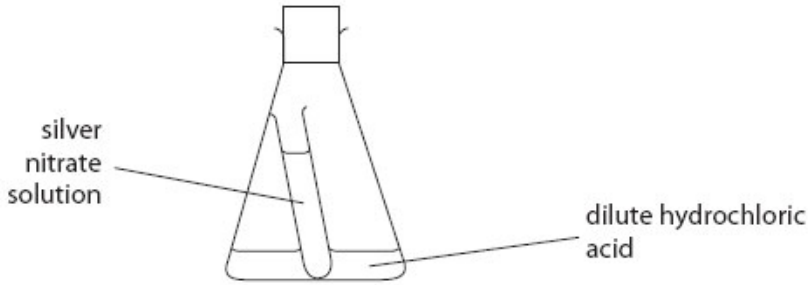
☒ **A** AgCl(aq)

☒ **B** AgCl(g)

☒ **C** AgCl(l)

☒ **D** AgCl(s)

(ii) This apparatus is used to investigate the mass of the reactants and the mass of products in this reaction.



The total mass of this apparatus was measured.
The flask was shaken to allow the silver nitrate solution and dilute hydrochloric acid to react.
After the reaction the total mass of the apparatus was measured again.

State how the total mass of the apparatus after the reaction will compare with the total mass of the apparatus before the reaction.

(1)

.....

(iii) Write the balanced equation for the reaction of silver nitrate solution, $AgNO_3$, with dilute hydrochloric acid to form silver chloride, AgCl, and nitric acid.

(2)

.....

(Total for Question = 9 marks)

(**Q21 1SC0/2CH, June 2013**)

Q39.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

The elements in group 7 of the periodic table are called the halogens.

(i) What is the colour of chlorine gas at room temperature

(1)

☒ **A** yellow-green

☒ **B** red-brown

☒ **C** purple

☒ **D** black

(ii) Damp blue litmus paper can be used to test for chlorine gas.

Use words from the box to complete the sentences.

(2)

blue	orange	red	white	yellow

When damp blue litmus paper is added to chlorine gas there are **two** colour changes.

The damp blue litmus paper changes from blue to
..... .

The colour of the litmus paper then changes to .....
.

(Total for question = 3 marks)

(**QU01b 1SC0/2CF, June 2025**)

Q40.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer

with a cross ☒.

Which of the following rows gives the colours of the group 7 elements chlorine and bromine at room temperature?

(1)

	chlorine	bromine
☒ **A**	red-brown	purple
☒ **B**	yellow-green	grey
☒ **C**	yellow-green	red-brown
☒ **D**	grey	red-brown

(Total for question = 1 mark)

(**Q02b 1SC0/2CF, June 2019**)