PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 6: GROUPS IN THE PERIODIC TABLE (PACK 1)

SCORE	PERCENTAGE
/114	%

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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)

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(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)

Q2.

(a) Hydrogen chloride, HCl, can be formed by the reaction of hydrogen, H_2, with chlorine, Cl_2.

Write the balanced equation for this reaction.

(2)

.....

(b) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.

(2)

Q3.

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)

Q4.

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)

Q5.

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)

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.....

empirical formula of this tin chloride = ...

(Total for question = 3 marks)

Q6.

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)

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

(2)

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

(4)

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(Total for question = 10 marks)

Q7.

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)

Q8.

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)

$$\text{.....K(.....)} + F_2(g) \rightarrow \text{.....KF(.....)}$$

(Total for question = 3 marks)

Q9.

This question is about the noble gases.

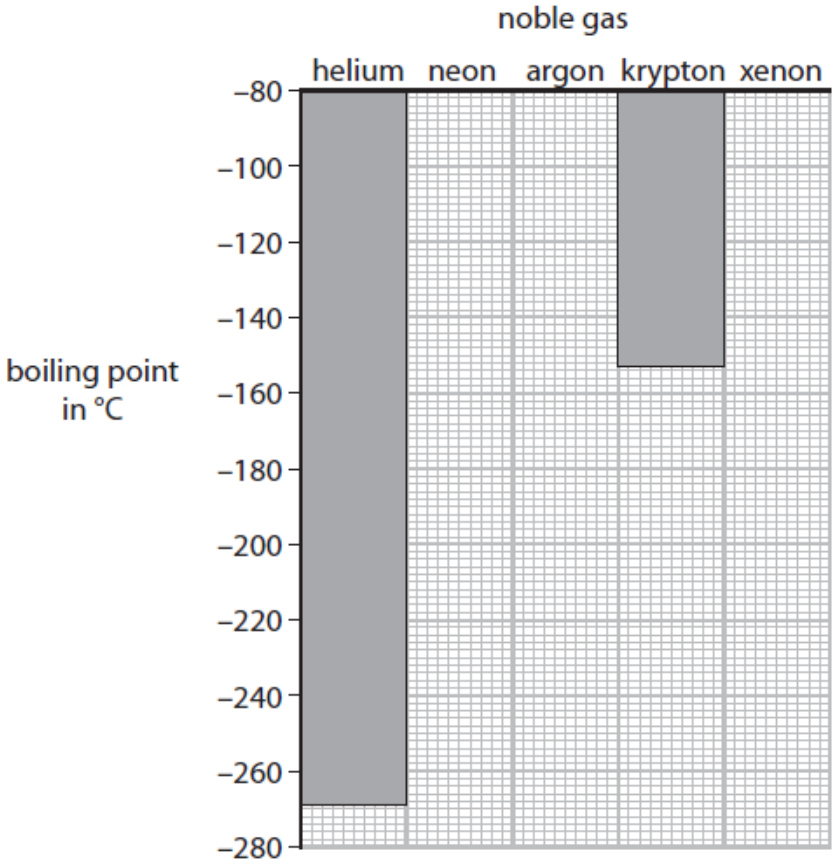
Figure 6 shows the boiling points of some of the noble gases.

noble gas	boiling point in °C
helium	–269
neon	–246
argon	–186
krypton	–153
xenon	

Figure 6

(i) Complete the bar chart to show the boiling points of neon and argon.

(2)



(ii) Predict the boiling point of xenon.

(1)

boiling point of xenon = ... °C

(Total for question = 3 marks)

Q10.

Complete the following sentences.

(i) The name given to group 7 in the periodic table is ..... .

(1)

(ii) The name given to group 0 in the periodic table is ..... .

(1)

(Total for question = 2 marks)

Q11.

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)

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(Total for question = 11 marks)

Q12.

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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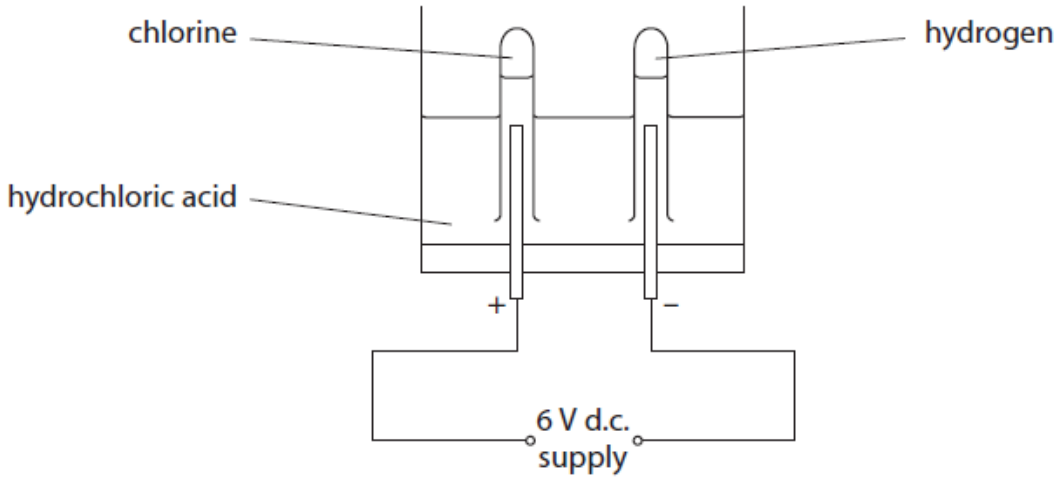
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(Total for question = 2 marks)

Q13.

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)

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(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)

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

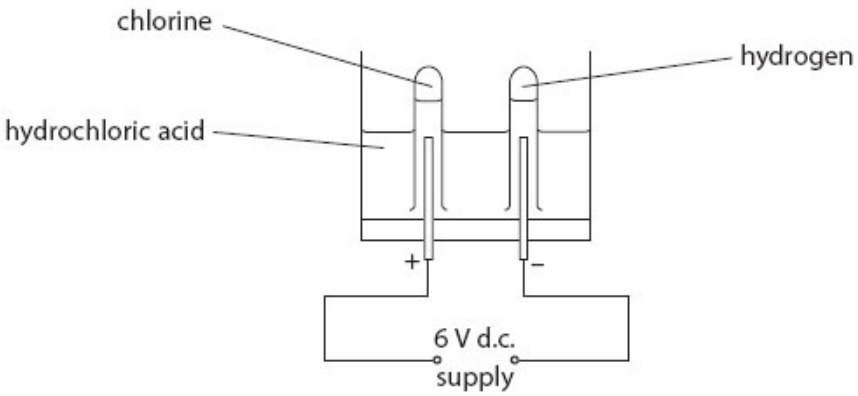
(1)

.....

Q14.

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.

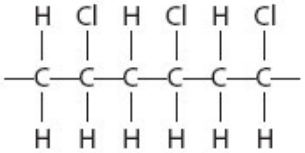
(2)

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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)

.....

Q15.

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)

Q16.

Aluminium reacts with chlorine to form aluminium chloride.

Write the balanced equation for this reaction.

(3)

.....

(Total for question = 3 marks)

Q17.

Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

Sodium reacts with water to form sodium hydroxide in solution and hydrogen.

Complete the balancing of the equation for this reaction and add the state symbols for each substance.

(3)

.....Na(.....) + $2H_2O$(.....) → .....NaOH(.....) + H_2(.....)

(Total for question = 3 marks)

Q18.

Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

Sodium reacts with water to form sodium hydroxide solution and hydrogen.

Complete the balancing of the equation for this reaction and add the state symbols for each substance.

(3)

.....Na(.....) + $2H_2O$(.....) → ..... NaOH(.....) + H_2(.....)

(Total for question = 3 marks)

Q19.

Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

In an experiment equal-sized pieces of lithium, sodium and potassium are added to separate samples of water.

(i) A flame is produced only with potassium because potassium

(1)

☒ **A** is the softest metal

☒ **B** has the lowest melting point

☒ **C** is the most reactive

☒ **D** is the only flammable metal

* (ii) A teacher demonstrated this experiment.

The results are shown in Figure 14.

	lithium	sodium	potassium
position of metal in water	floats	floats	floats
movement of metal	slow	fast	very fast
effervescence / bubbling	slow	fast	very fast

Figure 14

Describe, in detail, how the teacher would demonstrate this experiment safely, showing how the results give the order of reactivity of the metals.

(Total for question = 7 marks)

Q20.

Lithium, sodium and potassium are reactive metals in group 1 of the periodic table.

In an experiment equal-sized pieces of lithium, sodium and potassium are added to separate samples of water.

A flame is produced only with potassium because potassium

(1)

☒ **A** is the softest metal

☒ **B** has the lowest melting point

☒ **C** is the most reactive

☒ **D** is the only flammable metal

(Total for question = 1 mark)

Q21.

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

Bromine, chlorine and iodine are dissolved in water to make aqueous solutions.

Potassium iodide solution is added to each of these solutions.

Figure 6 shows the observations.

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

Figure 6

Explain the observations shown in the table.

(4)

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(Total for question = 4 marks)

Q22.

For many years, argon was used to fill filament light bulbs.

A filament light bulb is shown in Figure 4.

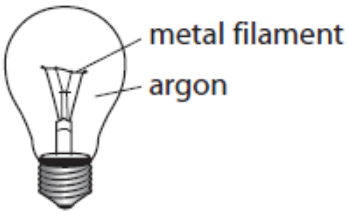


Figure 4

When the bulb is in use the metal filament becomes extremely hot.

Explain why argon, rather than air, was used to fill filament light bulbs.

(2)

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(Total for question = 2 marks)

Q23.

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

Figure 8 shows the electronic configurations of fluorine and chlorine.

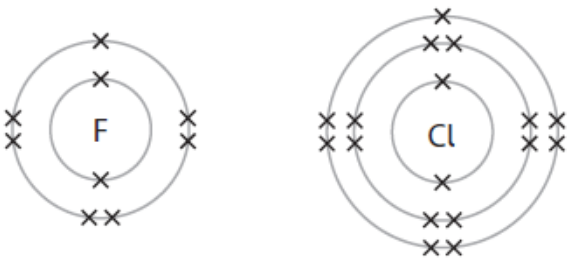


Figure 8

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)

Q24.

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 ☒.

* Group 1 metals react with the elements from group 7 to form salts.

Some examples of these reactions are shown in Figure 10.

reaction	word equation
W	lithium + chlorine → lithium chloride
X	potassium + fluorine → potassium fluoride
Y	rubidium + iodine → rubidium iodide
Z	potassium + bromine → potassium bromide

Figure 10

You will find the position of these elements in their groups on the periodic table.

Explain, in terms of their electronic configurations and the relative reactivity of these elements, which of the reactions shown in Figure 10 would be the most violent.

(6)

(Total for question = 6 marks)

Q25.

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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Q26.

Chlorine, bromine and iodine are elements in group 7 of the periodic table.

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)

Q27.

Figure 14 shows the melting points and boiling points of elements in group 7 of the periodic table.

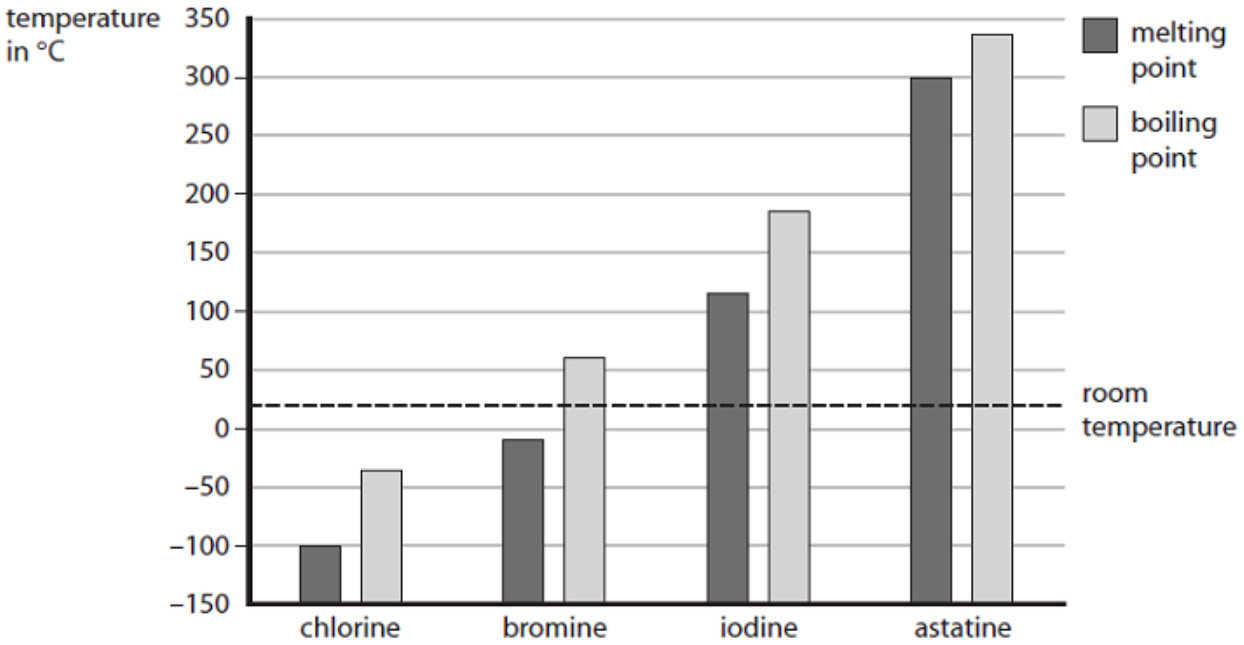


Figure 14

(i) Give, using Figure 14, the boiling point of bromine.

(1)

boiling point of bromine = ... °C

(ii) State which **two** elements from Figure 14 are solids at room temperature.

(1)

.....

(Total for question = 2 marks)

Q28.

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)

Q29.

Four of the noble gases are argon, helium, krypton and neon.

Give these gases in order of increasing density.

(2)

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.....

(Total for question = 2 marks)

Q30.

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

Q31.

Lithium, sodium and potassium are metals in group 1 of the periodic table.

State the name given to group 1 metals.

(1)

.....

(Total for question = 1 mark)

Q32.

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)

Q33.

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)

Q34.

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)

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Q35.

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	

Q36.

Magnesium reacts with bromine to form magnesium bromide.

Write the word equation for this reaction.

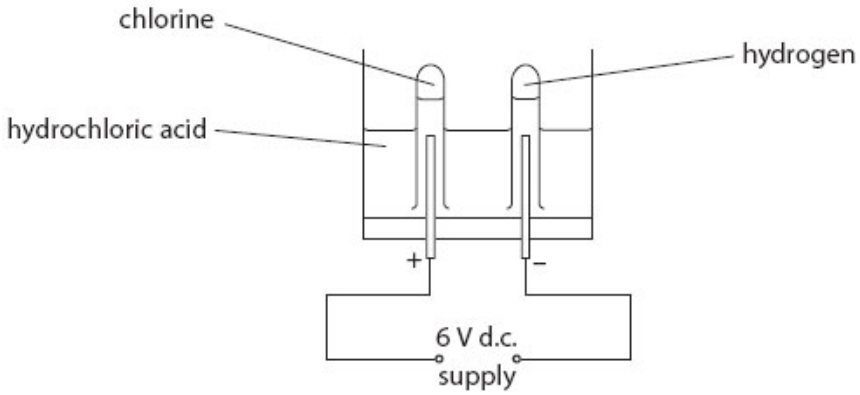
(2)

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Q37.

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

The apparatus used is shown.



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

(2)

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

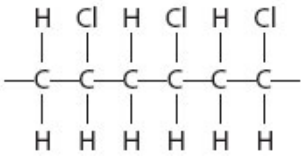
(2)

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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)

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

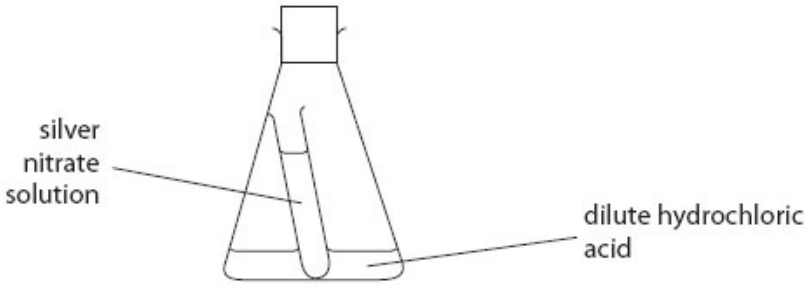
(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

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)

Q38.

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)