PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 6: GROUPS IN THE PERIODIC TABLE (PACK 2)

SCORE	PERCENTAGE
/84	%

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Q1.

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 some of the elements in group 7 of the periodic table.

Which row in the table correctly shows the colours and physical states of the elements at room temperature?

(1)

☐	**A**	iodine: purple gas	bromine: yellow liquid
☐	**B**	chlorine: pale green gas	iodine: brown solid
☐	**C**	bromine: red-brown liquid	chlorine: yellow liquid
☐	**D**	iodine: dark grey solid	bromine: red-brown liquid

(Total for question = 1 mark)

Q2.

Figure 2 shows the melting and boiling points of bromine and iodine.

element	melting point in °C	boiling point in °C
bromine	–7	59
iodine	114	184

Figure 2

Using the information in Figure 2, which row shows the physical states of these elements at 50 °C?

(1)

	bromine	iodine
☒ **A**	liquid	gas
☒ **B**	solid	liquid
☒ **C**	gas	solid
☒ **D**	liquid	solid

(Total for question = 1 mark)

Q3.

When iron reacts with chlorine, iron chloride is formed.

Two possible equations for this reaction are

A $Fe + Cl_2 \rightarrow FeCl_2$

B $2Fe + 3Cl_2 \rightarrow 2FeCl_3$

In an experiment, 8.40 g iron reacts with chlorine to form 19.05 g iron chloride.

Show, using a calculation, which reaction, **A** or **B**, is taking place.

You must show your working.

(relative atomic masses: Cl = 35.5, Fe = 56.0)

(3)

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(Total for question = 3 marks)

Q4.

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

Explain, in terms of electronic configurations, the increase in reactivity from lithium to sodium to potassium.

(2)

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(Total for question = 2 marks)

Q5.

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

At room temperature, iodine is a

(1)

☒ **A** brown gas

☒ **B** brown liquid

☒ **C** grey solid

☒ **D** purple gas

Q6.

(i) Figure 13 lists the halogens in the order in which they appear in group 7 of the periodic table.

The melting points of four of the halogens are given.

halogen	melting point in °C
fluorine	−220
chlorine	−101
bromine	−7
iodine	
astatine	302

Figure 13

Estimate the melting point of iodine.

(1)

..... °C

(ii) Bromine reacts with heated iron.

Give the name of one halogen that would react with iron more vigorously than bromine.

(1)

.....

(Total for question = 2 marks)

Q7.

(i) Figure 9 shows the melting point of the metals in group 1 of the periodic table.

element	melting point in °C
lithium	181
sodium	98
potassium	64
rubidium	
caesium	29
francium	27

Figure 9

Estimate the melting point of rubidium.

(1)

..... °C

(ii) Each of the metals in Figure 9 reacts with fluorine to form a metal fluoride.

Give the name of a group 1 metal that reacts with fluorine more vigorously than sodium.

(1)

.....

(Total for question = 2 marks)

Q8.

(a) Two pieces of metal can be joined by welding them together.



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

The structure of a metal is a lattice of

(1)

- ☒ **A** anions
- ☒ **B** anions and cations
- ☒ **C** cations in a sea of electrons
- ☒ **D** molecules in a sea of electrons

(ii) To join two pieces of metal by welding, they must be melted together.

State why a high temperature has to be used.

(1)

.....

.....

(iii) The pieces of metal are welded together in an atmosphere of argon.

Explain why an atmosphere of argon is used.

(2)

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(b) Some metals react with halogens.

Iron reacts with bromine, Br_2, to form iron(III) bromide, $FeBr_3$.

Write the balanced equation for this reaction.

(2)

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

At room temperature, iodine is a

(1)

☒ **A** brown gas

☒ **B** brown liquid

☒ **C** grey solid

☒ **D** purple gas

(d) When a halogen is added to a solution containing halide ions a displacement reaction may occur

In the table

✓ shows a displacement reaction occurs

× shows a displacement reaction does not occur

halogen added	halide ion in solution		
	chloride ion	bromide ion	iodide ion
chlorine		✓	✓
bromine	×		✓
iodine	×	×	

Use the information in the table to explain the order of reactivity of the three halogens.

(2)

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(Total for Question = 9 marks)

Q9.

Metals

There are many metallic elements in the periodic table.

(a) Which row of the table correctly shows two metals that are in group 1 and two metals that are transition metals?

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

(1)

	group 1	transition metals
☒ **A**	lithium and zinc	calcium and copper
☒ **B**	potassium and caesium	copper and iron
☒ **C**	sodium and potassium	copper and magnesium
☒ **D**	sodium and magnesium	manganese and nickel

(b) (i) Describe the structure of metals in terms of the particles present in their structures.

(2)

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(ii) Explain how metals conduct electricity.

(2)

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(c) (i) Describe what you would **see** when a small piece of sodium is added to water.

(2)

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(ii) Write the balanced equation for the reaction of sodium with water to form sodium hydroxide

and hydrogen.

(3)

.....

(Total for question = 10 marks)

Q10.

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

Lithium, sodium and potassium react with water.

Small pieces of each of these metals are added to separate large volumes of water.

Figure 8 shows the time each metal takes to react completely and the observations during the reaction.

metal	time for metal to react completely in s	observations
lithium	20	effervescence moves slowly on the surface makes an alkaline solution
sodium	10	melts vigorous effervescence moves quickly on the surface makes an alkaline solution
potassium	5	melts vigorous effervescence gas evolved catches fire moves very quickly on the surface makes an alkaline solution

Figure 8

In all three reactions the same gas is produced.

What is the name of this gas?

(1)

☒ **A** carbon dioxide

☒ **B** chlorine

☒ **C** hydrogen

☒ **D** oxygen

(Total for question = 1 mark)

Q11.

Describe what is **seen** when chlorine water is added to potassium bromide solution and the mixture shaken.

(2)

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.....

(Total for question = 2 marks)

Q12.

When a halogen is added to a solution containing halide ions a displacement reaction may occur

In the table

✓ shows a displacement reaction occurs

× shows a displacement reaction does not occur

halogen added	halide ion in solution		
	chloride ion	bromide ion	iodide ion
chlorine		✓	✓
bromine	×		✓
iodine	×	×	

Use the information in the table to explain the order of reactivity of the three halogens.

(2)

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Q13.

Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.

(2)

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(Total for question = 2 marks)

Q14.

Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.

(2)

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(Total for question = 2 marks)

Q15.

When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms.
Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

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.....

(Total for question = 1 mark)

Q16.

When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms.
Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

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.....

(Total for question = 1 mark)

Q17.

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

There is a trend in the colour and the state of the halogens at room temperature.

Predict the colour and state of astatine at room temperature.

(2)

colour .....

state .....

(Total for question = 2 marks)

Q18.

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 first four elements in group 1 are lithium, sodium, potassium and rubidium.

Rubidium reacts with water to form rubidium hydroxide and hydrogen.

$$2Rb(s) + 2H_2O(l) \rightarrow 2RbOH(aq) + H_2(g)$$

(i) Predict what you would see when a small piece of rubidium is placed in a large volume of water.

(3)

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.....

.....

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.....

(ii) Why is rubidium more reactive than potassium?

(1)

☐ **A** the metallic bonds in rubidium are weaker than those in potassium

☐ **B** rubidium is a softer metal than potassium

☐ **C** the outer electron of a rubidium atom is further from the nucleus than potassium's

☒ **D** rubidium has a more exothermic reaction with water than potassium does

(iii) 8.5 g of rubidium are reacted completely with water.

The reaction makes a solution of rubidium hydroxide.
The volume of this solution is 2.5 dm^3.

Calculate the concentration of the rubidium hydroxide solution in g dm^{-3}.

(relative atomic mass: Rb = 85; relative formula mass: RbOH = 102)

(4)

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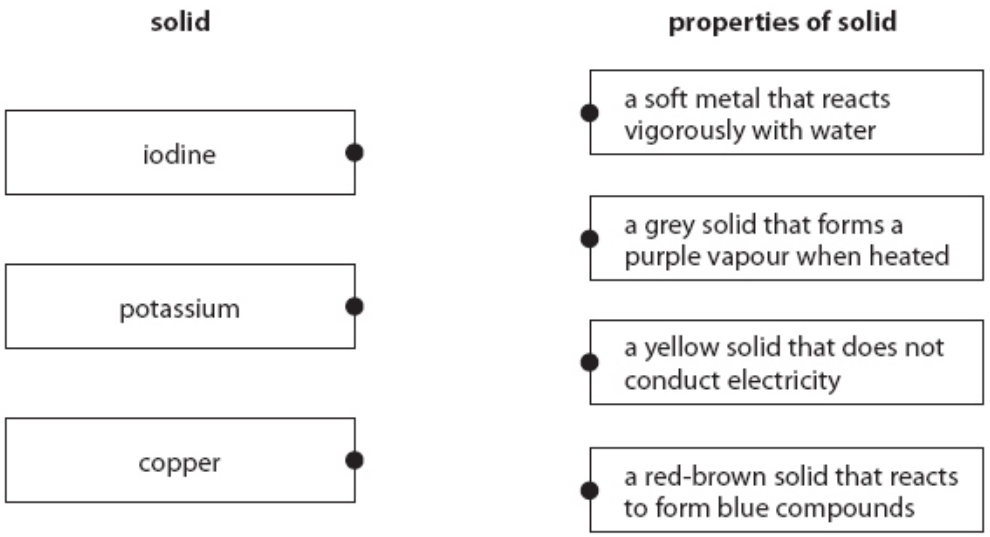
concentration = ... g dm^{-3}

(Total for question = 8 marks)

Q19.

The table shows some solids and some properties of solids.

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



Q20.

Chlorine reacts with potassium bromide to form potassium chloride and bromine.
In this reaction chlorine forms chloride ions

$$Cl_2 + 2KBr \rightarrow 2KCl + Br_2$$

(i) In this reaction, chlorine has been reduced.

Explain, using the equation, how you know that chlorine has been reduced.

(2)

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(ii) Write the half equation for the formation of bromine from bromide ions.

(2)

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(Total for question = 4 marks)

Q21.

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

Rubidium is below potassium in group 1.

In another experiment, a small piece of rubidium is added to water.

(i) Use Figure 8 to predict the time taken for this piece of rubidium to react completely.

(1)

time taken = ... s

(ii) Give **two** observations you would expect to make when rubidium is added to water.

(2)

1 .....

.....

2 .....

.....

(Total for question = 3 marks)

Q22.

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

State a safety precaution that should be taken when group 1 metals are added to water.

(1)

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.....

(Total for question = 1 mark)

Q23.

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

Chlorine is toxic.

State **one** safety precaution that should be taken when using chlorine in the laboratory.

(1)

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.....

(Total for question = 1 mark)

Q24.

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

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

(i) State the name given to the group 7 elements.

(1)

.....

(ii) Name one other element that is in group 7.
Use the periodic table on the back of this exam paper to help you.

(1)

.....

(iii) Which element is liquid at room temperature and pressure?

(1)

☒ **A** fluorine

☒ **B** chlorine

☒ **C** bromine

☒ **D** iodine

(iv) Which element is dark-grey in colour at room temperature and pressure?

(1)

☒ **A** fluorine

☒ **B** chlorine

☒ **C** bromine

☒ **D** iodine

(Total for question = 4 marks)

Q25.

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

Bromine reacts with hydrogen to form hydrogen bromide.
Hydrogen bromide dissolves in water to form a solution.

State the name of the solution formed.

(1)

.....

(Total for question = 1 mark)

Q26.

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 ☒.

What are the elements in group 1 of the periodic table called?

(1)

☒ **A** alkali metals

☒ **B** fullerenes

☒ **C** halogens

☒ **D** noble gases

(Total for question = 1 mark)

Q27.

This question is about the noble gases.

(i) State, in terms of outer shell electrons, why the noble gases are unreactive.

(1)

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(ii) Figure 4 shows an airship, filled with helium, floating above the ground.

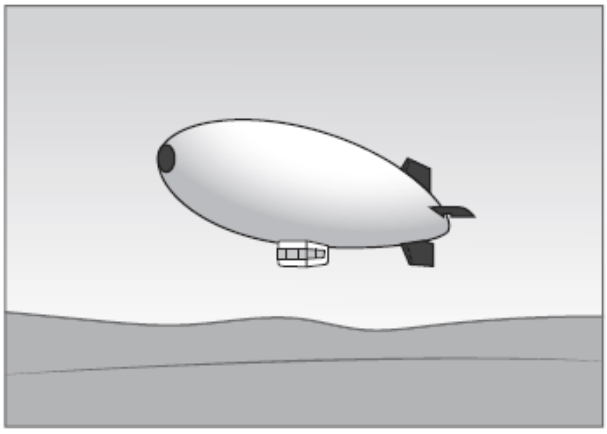


Figure 4

Helium, hydrogen and krypton are gases.
Figure 5 shows the reactivity and density, at room temperature and pressure, of helium, hydrogen and krypton.

gas	reactivity	density in g cm^{-3}
helium	unreactive	0.00018
hydrogen	very reactive	0.00009
krypton	unreactive	0.00380

Figure 5

The density of air is 0.001225 g cm^{-3}.

Helium is used in airships.

Explain why hydrogen and why krypton are **not** used in airships.

(3)

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(Total for question = 4 marks)

Q28.

Chlorine is a halogen.

Describe the test to show that a gas is chlorine.

(2)

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(Total for question = 2 marks)

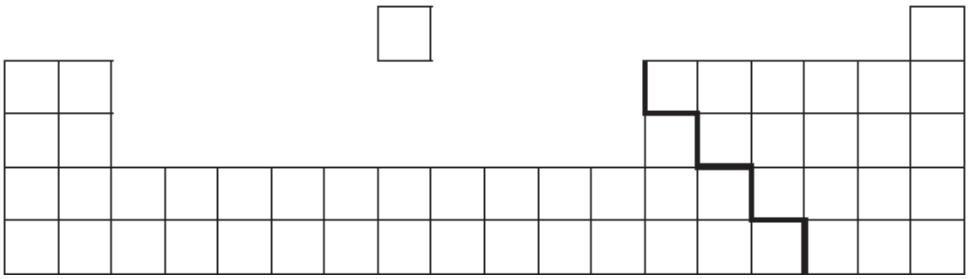
Q29.

* Here is some information about the periodic table.

In the periodic table elements are arranged in rows and columns.
The position of an element in the periodic table depends on its atomic structure.
Elements with similar chemical properties are found in the same parts of the periodic table.

Identify different parts of the periodic table and explain how the position of an element in the periodic table is linked to its chemical properties and atomic structure.

(You are provided with an outline of the periodic table below and you may use this to help your answer.)



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Q30.

Some of the elements in the periodic table are metals.

Lithium, potassium and rubidium are alkali metals.

(i) Describe what you would see when a small piece of rubidium is dropped on to water.

(2)

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(ii) The electronic configuration of lithium is 2.1
The electronic configuration of potassium is 2.8.8.1
Lithium is less reactive than potassium.

Explain, in terms of their electronic configurations, why lithium is less reactive than potassium.

(3)

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(Total for question = 5 marks)

Q31.

The densities of some elements in group 0 are shown in Figure 3.

name	density in g cm^{-3}
helium	0.15
neon	1.2
argon	1.4
krypton	
xenon	3.5

Figure 3

Use the information in Figure 3 to suggest the density of krypton.

(1)

density of krypton = ... g cm^{-3}

(Total for question = 1 mark)

Q32.

The density of a gas can be found using the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

A student carried out an experiment to find the density of argon.

The mass of a stopper and flask, containing no gas, was known.
The flask was completely filled with argon and its mass measured.

Figure 4 shows the results the student wrote down.

mass of stopper and flask in g	78.639
mass of stopper and flask full of argon in g	79.120
volume of flask in cm^3	250.0

Figure 4

(i) Use the results to calculate the density of argon in g cm^{-3}.

(2)

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.....

.....

density of argon = ... g cm^{-3}

(ii) The flask used for the experiment is shown in Figure 5.

The flask holds 250.0 cm^3 when filled up to the line.

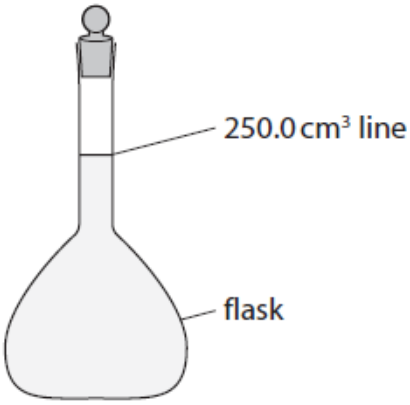


Figure 5

There is an error in the volume the student has used in the calculation.
This would give an incorrect value for the density of argon.

Identify this error and state what should be done to correct it.

(2)

error .....

.....

what should be done to correct it .....

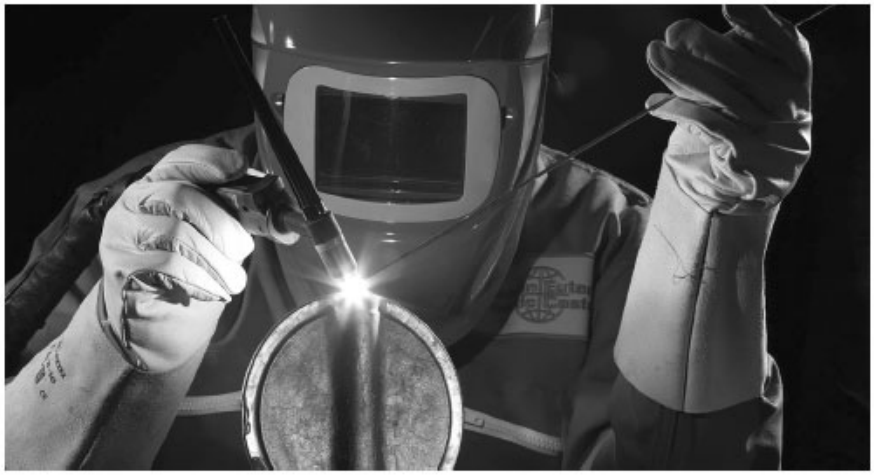
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(Total for question = 4 marks)

Q33.

Two pieces of metal can be joined by welding them together.



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

The structure of a metal is a lattice of

(1)

☒ **A** anions

☒ **B** anions and cations

☒ **C** cations in a sea of electrons

☒ **D** molecules in a sea of electrons

(ii) To join two pieces of metal by welding, they must be melted together.

State why a high temperature has to be used.

(1)

.....

.....

(iii) The pieces of metal are welded together in an atmosphere of argon.

Explain why an atmosphere of argon is used.

(2)

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Q34.

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 potassium and zinc.

Which of the following temperatures is most likely to be the melting point of potassium?

(1)

☒ **A** –63 °C

☒ **B** 6.3 °C

☒ **C** 63 °C

☒ **D** 630 °C

(Total for question = 1 mark)

Q35.

Chlorine reacts with hydrogen to form hydrogen chloride.

Write the balanced equation for this reaction.

(3)

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(Total for question = 3 marks)

Q36.

Chlorine reacts with hydrogen to form hydrogen chloride.

Write the balanced equation for this reaction.

(3)

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(Total for question = 3 marks)

Q37.

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

Fluorine reacts vigorously with iron to produce iron(III) fluoride, FeF_3.

Write the balanced equation for this reaction.

(2)

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(Total for question = 2 marks)

Q38.

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

Chlorine reacts with hydrogen to form hydrogen chloride.

(i) Write the word equation for this reaction.

(1)

..... → .....

(ii) Hydrogen chloride dissolves in water to form an acidic solution.

State what is **seen** when blue litmus paper is placed into this solution.

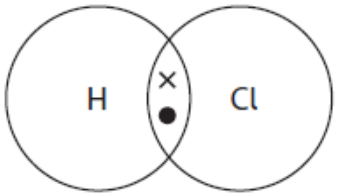
(1)

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(iii) A chlorine atom has seven electrons in its outer shell.
A hydrogen atom has one electron in its outer shell.

Complete the dot and cross diagram of a molecule of hydrogen chloride.
Show outer shell electrons only.

(1)



(iv) Name the type of bonding in a molecule of hydrogen chloride.

(1)

.....

(Total for question = 4 marks)