



**ST MARY'S SCIENCE
DEPARTMENT:
CHEMISTRY**

H

**GCSE CHEMISTRY HOMEWORK BOOK
TOPIC 2: BONDING, STRUCTURE AND THE
PROPERTIES OF MATTER
STUDENT BOOK**

**YOU MUST ANSWER ALL THREE SECTIONS IN EACH
PART OF THE HOMEWORK TASKS**

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
5		
OVERALL		

**GCSE
CHEMISTRY
YEAR 9
TOPIC 2**



HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Chemical Bonding			
Task 2 Ionic Bonding			
Task 3 Covalent Bonding			
Task 4 Carbon Allotropes			
Task 5 Metallic Bonding			



SCIENCE DEPARTMENT MARKING CODE

ID = Insufficient detail in answer

W = Wrong understanding of science

IR = Irrelevant information given.

V = This is too vague to get a mark.

AQ = Answer the question asked

R = Read the question/information

M = Maths mistake

BOD = Benefit of the doubt given.

E = Explain the answer further please.

U = Wrong units used.

SF = Wrong significant figures used.

SP = Wrong spelling of a technical term

SR = Same reason given more than once.

A circle means this lost you marks

An underline means this gained you marks

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

**TASK 1: CHEMICAL BONDING****SPEC CHECK**

Content	Achieved?
<p>There are three types of strong chemical bonds: ionic, covalent and metallic. For ionic bonding the particles are oppositely charged ions.</p> <p>For covalent bonding the particles are atoms which share pairs of electrons. For metallic bonding the particles are atoms which share delocalised electrons.</p> <p>Ionic bonding occurs in compounds formed from metals combined with non-metals.</p> <p>Covalent bonding occurs in most non-metallic elements and in compounds of non-metals.</p> <p>Metallic bonding occurs in metallic elements and alloys. Students should be able to explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons.</p>	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task?
Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

**SECTION A**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. This question is about elements in the periodic table.

1.1 What order did scientists use to arrange elements in early periodic tables?

[1 mark]

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1.2 In the early periodic tables some elements were placed in the wrong groups.

Mendeleev overcame this in his periodic table.

Give **one** way Mendeleev did this.

[1 mark]

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Table 2 shows the boiling points of fluorine, chlorine and bromine.

Table 2

Element	Boiling point in °C
Fluorine	-186
Chlorine	-34
Bromine	+59

1.3 Explain why the boiling points in **Table 2** are low.

[2 marks]

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1.4 Explain the trend in the boiling points in **Table 2**.

[3 marks]

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1.5 Explain why neon is unreactive.

Give the electronic structure of neon in your answer.

[2 marks]

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SECTION B

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Glass is made from silicon dioxide.



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1.1 Silicon dioxide has a very high melting point.

Other substances are added to silicon dioxide to make glass. Glass melts at a lower temperature than silicon dioxide.

Suggest why.

[1 mark]

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Sodium oxide is one of the substances added to silicon dioxide to make glass.

1.2 Sodium oxide contains Na^+ ions and O^{2-} ions.

Give the formula of sodium oxide.

[1 mark]

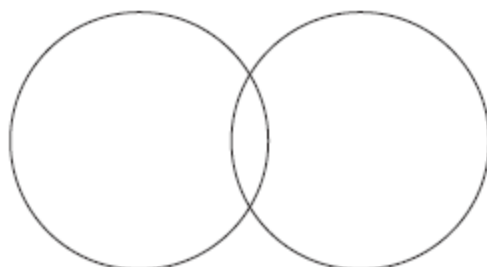
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1.3 Sodium oxide is made by heating sodium metal in oxygen gas.

Complete the diagram to show the outer electrons in an oxygen molecule (O_2).

[2 marks]



1.4 Glass can be coloured using tiny particles of gold. Gold is a metal.

Describe the structure of a metal.

[3 marks]

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SECTION C

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. This question is about the halogens.

1.1 Write the state symbol for chlorine at room temperature.

[1 mark]

Cl₂ (_____)

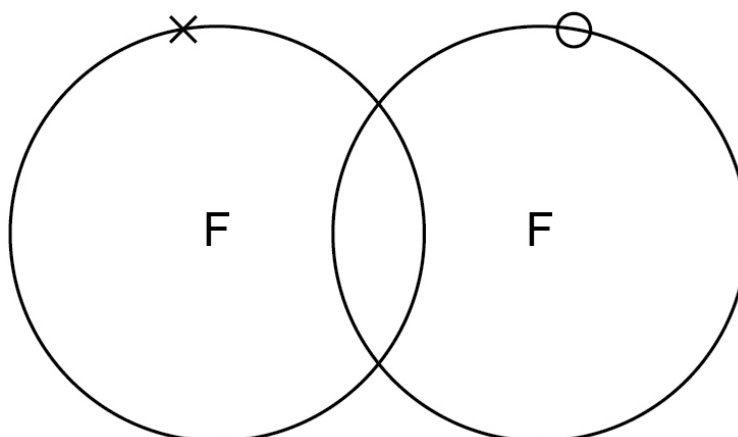
1.2 **Figure 4** represents one molecule of fluorine.

Complete the dot and cross diagram on **Figure 4**

You should show only the electrons in the outer shells.

[2 marks]

Figure 4



1.3 A fluorine atom can be represented as ${}^{19}_{9}\text{F}$

What is the total number of electrons in a fluorine molecule (F₂)?

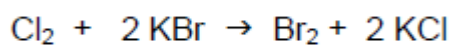
[1 mark]

Tick **one** box.

9 14 18 38



1.4 When chlorine reacts with potassium bromide, chlorine displaces bromine.



Explain why chlorine is more reactive than bromine.

[3 marks]

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FEEDBACK SHEET

Overall Mark:	/23	GRADE ACHIEVED:	
Section A: Mark	/9	9 <input type="checkbox"/>	5 <input type="checkbox"/>
Section B: Mark	/7	8 <input type="checkbox"/>	4 <input type="checkbox"/>
Section C: Mark	/7	7 <input type="checkbox"/>	3 <input type="checkbox"/>
		6 <input type="checkbox"/>	U <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
Strengths:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific) <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving			
Areas to Improve:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific) <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving			
Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	(your target)
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

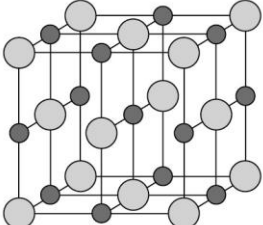
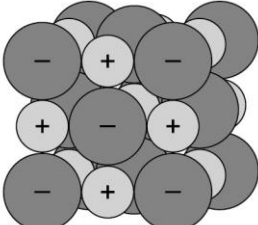
<input type="checkbox"/> Carry out independent revision. <input type="checkbox"/> Complete outstanding work. <input type="checkbox"/> Make corrections as indicated by the teacher. <input type="checkbox"/> Attend intervention for this topic <input type="checkbox"/> Include more information in responses. <input type="checkbox"/> Include more key words in responses. <input type="checkbox"/> Attend departmental revision sessions. <input type="checkbox"/> Read the questions carefully. <input type="checkbox"/> Explain your answers in more detail. <input type="checkbox"/> Carry out revision on Seneca Learning.	<input type="checkbox"/> Revise the equations. <input type="checkbox"/> Check the units on answers. <input type="checkbox"/> Check the correct amount of sig figs on answers. <input type="checkbox"/> Check to convert values correctly. <input type="checkbox"/> Show your full working out. <input type="checkbox"/> Check your calculations. <input type="checkbox"/> Revise the science investigative skills. <input type="checkbox"/> Revise the key concepts of the topics. <input type="checkbox"/> Thoroughly check your work for mistakes. Other:
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Student response



TASK 2: IONIC BONDING

SPEC CHECK

Content	Achieved?
<p>When a metal atom reacts with a non-metal atom electrons in the outer shell of the metal atom are transferred. Metal atoms lose electrons to become positively charged ions. Non-metal atoms gain electrons to become negatively charged ions. The ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 have the electronic structure of a noble gas (Group 0).</p> <p>The electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram, e.g. for sodium chloride</p> $\text{Na} \cdot + \begin{array}{c} \times \times \\ \times \text{Cl} \times \\ \times \times \end{array} \longrightarrow \left[\text{Na} \right]^+ \left[\begin{array}{c} \times \times \\ \times \text{Cl} \times \\ \times \times \end{array} \right]^-$ <p>(2,8,1) (2,8,7) (2,8) (2,8,8)</p> <p>Students should be able to draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7.</p> <p>The charge on the ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 relates to the group number of the element in the periodic table.</p> <p>Students should be able to work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7.</p>	
<p>An ionic compound is a giant structure of ions. Ionic compounds are held together by strong electrostatic forces of attraction between oppositely charged ions. These forces act in all directions in the lattice and this is called ionic bonding.</p> <p>The structure of sodium chloride can be represented in the following forms:</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">  </div> <div style="margin-right: 20px;"> <p>Key</p> <p>● Na⁺</p> <p>○ Cl⁻</p> </div> <div>  </div> </div>	
<p>Students should be able to:</p> <ul style="list-style-type: none"> deduce that a compound is ionic from a diagram of its structure in one of the specified forms. describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure. work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure. <p>Students should be familiar with the structure of sodium chloride but do not need to know the structures of other ionic compounds.</p>	

**SECTION A**

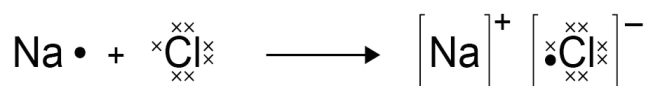
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. In the formation of sodium chloride, electrons are transferred from the sodium to the chlorine. The dot and cross diagram below shows this.

1.1 Write the electronic structure of each particle below.

[1 mark]



Draw dot and cross diagrams similar to the one in question 5 to show the formation of the following ionic compounds. In each case, include the formula of the compound

1.2 Lithium fluoride

[3 marks]

1.3 Magnesium oxide

[3 marks]

1.4 Magnesium fluoride

[3 marks]

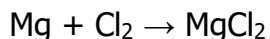


SECTION B

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. The equation shows the reaction between magnesium and chlorine to produce magnesium chloride.



Magnesium chloride consists of Mg^{2+} and Cl^- ions.

Describe, in terms of electrons, how magnesium chloride is produced from magnesium and chlorine.

[6 marks]

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SECTION C

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. Sodium chloride is an ionic compound.

1.1 Explain why ionic compounds are usually solid at room temperature.

[2 marks]

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1.2 Recent research has developed a new type of substance, ionic liquids.

Ionic liquids have melting points at close to or below room temperature.

Ionic liquids are used in batteries as they conduct electricity.

Explain why ionic liquids are used in batteries but solid ionic compounds are not.

[3 marks]

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1.3 A student was investigating a compound, **X**.

The student decided that compound **X** was an ionic compound.

Give three properties of ionic compounds that the student may have found.

[3 marks]

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FEEDBACK SHEET

Overall Mark:	/24	GRADE ACHIEVED:	
Section A: Mark	/10	9 <input type="checkbox"/>	5 <input type="checkbox"/>
Section B: Mark	/6	8 <input type="checkbox"/>	4 <input type="checkbox"/>
Section C: Mark	/8	7 <input type="checkbox"/>	3 <input type="checkbox"/>
		6 <input type="checkbox"/>	U <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
Strengths:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific) <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving			
Areas to Improve:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific) <input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving			
Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	(your target)
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

<input type="checkbox"/> Carry out independent revision. <input type="checkbox"/> Complete outstanding work. <input type="checkbox"/> Make corrections as indicated by the teacher. <input type="checkbox"/> Attend intervention for this topic <input type="checkbox"/> Include more information in responses. <input type="checkbox"/> Include more key words in responses. <input type="checkbox"/> Attend departmental revision sessions. <input type="checkbox"/> Read the questions carefully. <input type="checkbox"/> Explain your answers in more detail. <input type="checkbox"/> Carry out revision on Seneca Learning.	<input type="checkbox"/> Revise the equations. <input type="checkbox"/> Check the units on answers. <input type="checkbox"/> Check the correct amount of sig figs on answers. <input type="checkbox"/> Check to convert values correctly. <input type="checkbox"/> Show your full working out. <input type="checkbox"/> Check your calculations. <input type="checkbox"/> Revise the science investigative skills. <input type="checkbox"/> Revise the key concepts of the topics. <input type="checkbox"/> Thoroughly check your work for mistakes. Other:
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Student response

**SECTION A**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

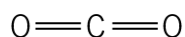
1. In some molecules, more than one pair of electrons is shared between two atoms.

In these cases, the molecules contain a double (two shared pairs of electrons) or a triple (three shared pairs of electrons) covalent bond.

For each of the molecules below, state the molecular formula and draw a dot and cross diagram.

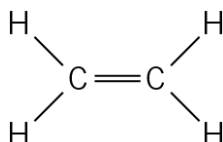
Use the displayed formula to help you.

1.1 carbon dioxide



[2 Marks]

1.2 ethane

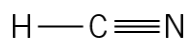


[2 Marks]

1.3 nitrogen $\text{N}\equiv\text{N}$

[2 Marks]

1.4 hydrogen cyanide.



[2 Marks]



1.5 Draw the dot and cross diagram and displayed formula for the molecule ethyne, C_2H_2 .

[2 Marks]

**SECTION B**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Hydrogen sulfide is a gas at room temperature.

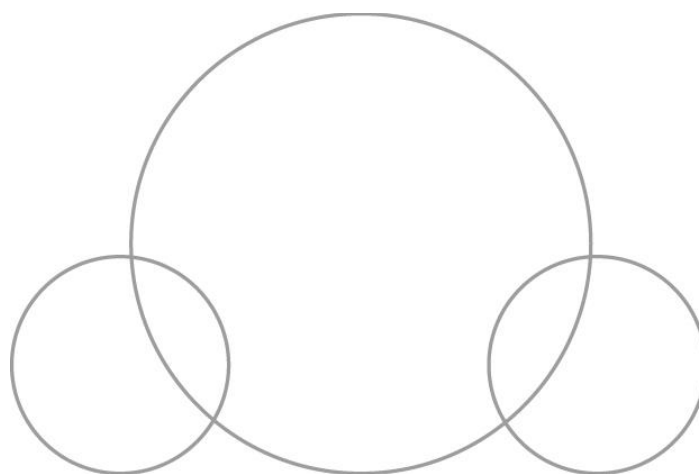
Figure 2 represents the outer energy levels of hydrogen and sulfur atoms.

Complete the diagram to show the bonding in hydrogen sulfide. Show the outer electrons only.

1.1 Hydrogen and sulfur are represented as ${}^1_1\text{H}$ and ${}^{32}_{16}\text{S}$ in the periodic table.

[2 marks]

Figure 2



1.2 The boiling point of hydrogen sulfide is low. Explain why.

[3 Marks]

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**SECTION C**

This is a challenge question to extend your understanding.

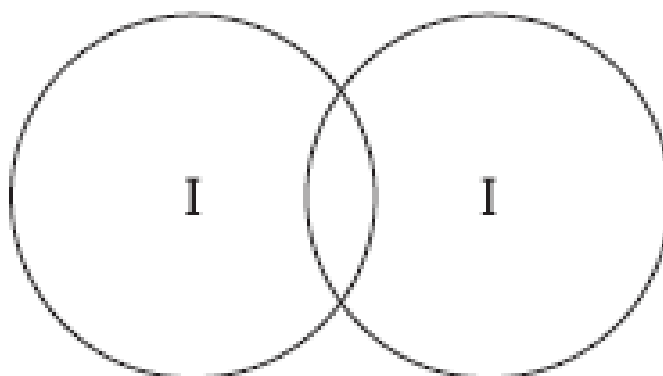
You should aim to spend **10 minutes** answering this section.

1. Iodine is in Group 7.

1.1 Complete the diagram below to show the bonding in iodine, I_2 .

Show the outer electrons only.

[2 marks]



1.2 Explain, in terms of particles, why liquid iodine does not conduct electricity.

[3 marks]

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1.3 Many people do not have enough iodine in their diet.

Some scientists recommend that salt should have a compound of iodine added.

Give **one** ethical reason why a compound of iodine should **not** be added to food.

[1 mark]

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FEEDBACK SHEET

Overall Mark:	/21	GRADE ACHIEVED:	
Section A: Mark	/10	9 <input type="checkbox"/>	5 <input type="checkbox"/>
Section B: Mark	/5	8 <input type="checkbox"/>	4 <input type="checkbox"/>
Section C: Mark	/6	7 <input type="checkbox"/>	3 <input type="checkbox"/>
		6 <input type="checkbox"/>	U <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
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Areas to Improve:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
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Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

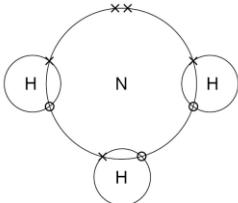
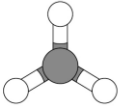
<input type="checkbox"/> Carry out independent revision. <input type="checkbox"/> Complete outstanding work. <input type="checkbox"/> Make corrections as indicated by the teacher. <input type="checkbox"/> Attend intervention for this topic <input type="checkbox"/> Include more information in responses. <input type="checkbox"/> Include more key words in responses. <input type="checkbox"/> Attend departmental revision sessions. <input type="checkbox"/> Read the questions carefully. <input type="checkbox"/> Explain your answers in more detail. <input type="checkbox"/> Carry out revision on Seneca Learning.	<input type="checkbox"/> Revise the equations. <input type="checkbox"/> Check the units on answers. <input type="checkbox"/> Check the correct amount of sig figs on answers. <input type="checkbox"/> Check to convert values correctly. <input type="checkbox"/> Show your full working out. <input type="checkbox"/> Check your calculations. <input type="checkbox"/> Revise the science investigative skills. <input type="checkbox"/> Revise the key concepts of the topics. <input type="checkbox"/> Thoroughly check your work for mistakes. Other:
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Student response



TASK 4: CARBON ALLOTROPES

SPEC CHECK

Content	Achieved?
<p>When atoms share pairs of electrons, they form covalent bonds. These bonds between atoms are strong. Covalently bonded substances may consist of small molecules. Students should be able to recognise common substances that consist of small molecules from their chemical formula. Some covalently bonded substances have very large molecules, such as polymers. Some covalently bonded substances have giant covalent structures, such as diamond and silicon dioxide. The covalent bonds in molecules and giant structures can be represented in the following forms:</p> <p style="text-align: center;">For ammonia (NH₃)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>and/or</p> $\begin{array}{ccc} & \times \times & \\ \text{H} \times & \text{N} & \times \text{H} \\ & \times \text{O} & \\ & \text{H} & \end{array}$ </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;"> <p>and/or</p> $\begin{array}{c} \text{H} - \text{N} - \text{H} \\ \\ \text{H} \end{array}$ </div> <div style="text-align: center;"> <p>and/or</p>  </div> </div> <p>Polymers can be represented in the form:</p> $\left(\begin{array}{cc} \text{H} & \text{H} \\ & \\ -\text{C} & - & \text{C}- \\ & \\ \text{H} & \text{H} \end{array} \right)_n$ <p>poly(ethene)</p> <p>where n is a large number.</p>	

**SECTION A**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1.

An ionic compound X_2Y contains two ions, X^+ and Y^{2-} .

Which group is each ion in?

[2 marks]

X^+

Y^{2-}

Complete **Table 1**.

[3 marks]**Table 1**

Substance	Melting point in °C	Does substance conduct electricity as a solid?	Does substance conduct electricity as a liquid?	Type of structure
A	842	Yes	Yes
B	1610	no
C	772	ionic

**SECTION B**

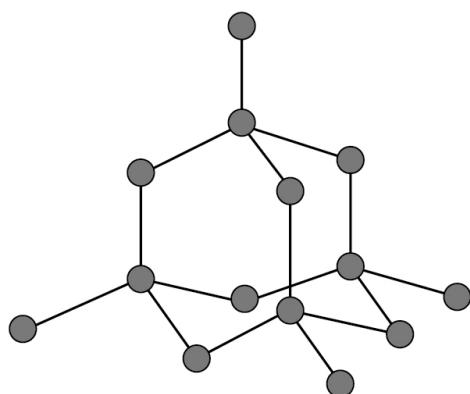
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

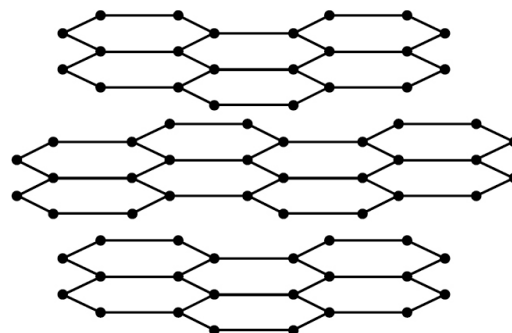
1. This question is about carbon.

Figure 10 shows the arrangement of carbon atoms in diamond and graphite.

Figure 10



Diamond



Graphite

1.1 Describe the structure in diamond.

[2 marks]

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1.2 Explain why graphite is soft.

[3 marks]

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1.3 Explain why graphite conducts electricity.

[2 marks]

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SECTION C

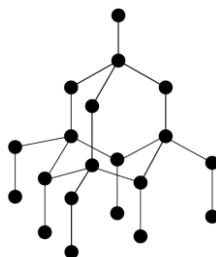
This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. This question is about structure and bonding.

1.1 **Figure 5** shows part of the structure and bonding in diamond.

Figure 5



Explain why diamond has a high melting point.

[3 marks]

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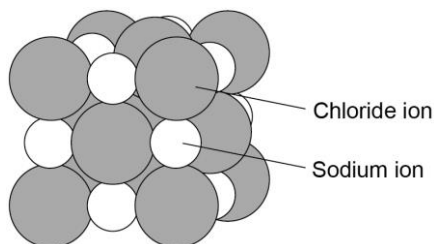
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1.2 **Figure 6** shows part of the structure and bonding in sodium chloride (NaCl).

Figure 6



Explain the conditions needed for sodium chloride to conduct electricity.

[3 marks]

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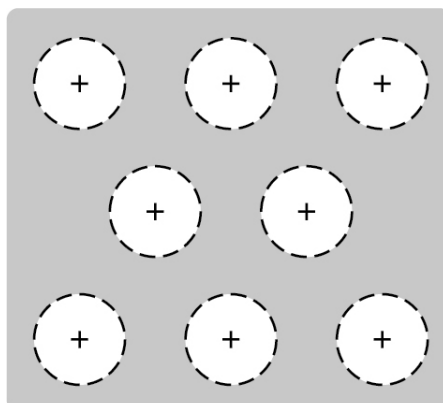
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1.3 Figure 7 shows the structure of sodium.

Figure 7



Describe how sodium conducts thermal energy.

[3 marks]

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FEEDBACK SHEET

Overall Mark:	/21	GRADE ACHIEVED:	
Section A: Mark	/5	9 <input type="checkbox"/>	5 <input type="checkbox"/>
Section B: Mark	/7	8 <input type="checkbox"/>	4 <input type="checkbox"/>
Section C: Mark	/9	7 <input type="checkbox"/>	3 <input type="checkbox"/>
		6 <input type="checkbox"/>	U <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
Strengths:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
Areas to Improve:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	(your target)
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

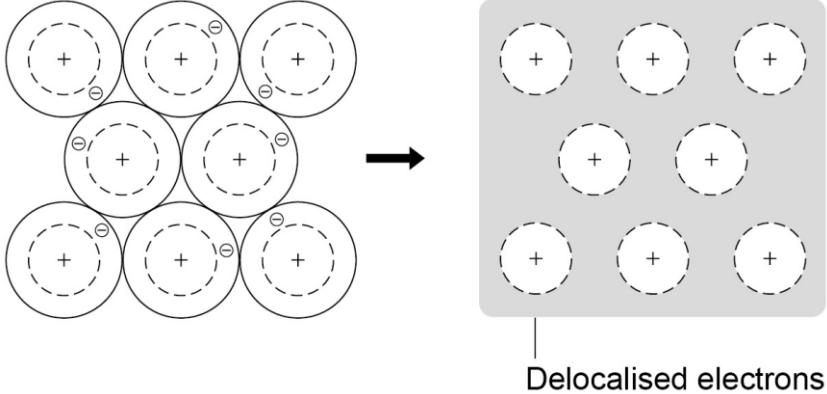
<input type="checkbox"/> Carry out independent revision. <input type="checkbox"/> Complete outstanding work. <input type="checkbox"/> Make corrections as indicated by the teacher. <input type="checkbox"/> Attend intervention for this topic <input type="checkbox"/> Include more information in responses. <input type="checkbox"/> Include more key words in responses. <input type="checkbox"/> Attend departmental revision sessions. <input type="checkbox"/> Read the questions carefully. <input type="checkbox"/> Explain your answers in more detail. <input type="checkbox"/> Carry out revision on Seneca Learning.	<input type="checkbox"/> Revise the equations. <input type="checkbox"/> Check the units on answers. <input type="checkbox"/> Check the correct amount of sig figs on answers. <input type="checkbox"/> Check to convert values correctly. <input type="checkbox"/> Show your full working out. <input type="checkbox"/> Check your calculations. <input type="checkbox"/> Revise the science investigative skills. <input type="checkbox"/> Revise the key concepts of the topics. <input type="checkbox"/> Thoroughly check your work for mistakes. Other:
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Student response



TASK 5: METALLIC BONDING

SPEC CHECK

Content	Achieved?
<p>Metals consist of giant structures of atoms arranged in a regular pattern. The electrons in the outer shell of metal atoms are delocalised and so are free to move through the whole structure. The sharing of delocalised electrons gives rise to strong metallic bonds. The bonding in metals may be represented in the following form:</p>  <p style="text-align: center;">Delocalised electrons</p>	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?



SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Silver nanoparticles are included in the material sports socks are made from. Silver nanoparticles can kill bacteria.

A silver atom has a diameter of 2.8×10^{-10} m.

1.1 Give the maximum and minimum number of silver atoms in the thickness of a nanoparticle.

[2 Marks]

.....
.....

1.2 Some people disagree with the use of silver nanoparticles.

Suggest why.

[1 Mark]

.....
.....

Three oxides have the following melting points; $-72\text{ }^\circ\text{C}$, $1132\text{ }^\circ\text{C}$, and $2572\text{ }^\circ\text{C}$.

The three oxides are calcium oxide, CaO, sodium oxide, Na₂O, and Sulfur dioxide, SO₂.

1.3 Predict the melting point of each oxide. Give reasons for your answers.

[3 Marks]

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Graphite is an excellent conductor of electricity.

1.4 Explain how graphite conducts electricity.

[2 Marks]

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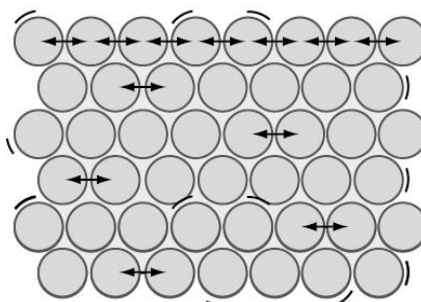


SECTION C

This is a challenge question to extend your understanding.
You should aim to spend **10 minutes** answering this section.

1. **Figure 1** represents the particles in a solid.

Figure 1
solid



Describe what happens to particles when a substance changes state.

You should refer to the arrangement, energy and movement of the particles in all three states of matter.

[6 Marks]

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FEEDBACK SHEET

Overall Mark:	/23	GRADE ACHIEVED:	
Section A: Mark	/8	9 <input type="checkbox"/>	5 <input type="checkbox"/>
Section B: Mark	/9	8 <input type="checkbox"/>	4 <input type="checkbox"/>
Section C: Mark	/6	7 <input type="checkbox"/>	3 <input type="checkbox"/>
		6 <input type="checkbox"/>	U <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
Strengths:	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills Others (Topic Specific)			
Areas to Improve:	<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving			
Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	(your target)
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

<input type="checkbox"/> Carry out independent revision. <input type="checkbox"/> Complete outstanding work. <input type="checkbox"/> Make corrections as indicated by the teacher. <input type="checkbox"/> Attend intervention for this topic <input type="checkbox"/> Include more information in responses. <input type="checkbox"/> Include more key words in responses. <input type="checkbox"/> Attend departmental revision sessions. <input type="checkbox"/> Read the questions carefully. <input type="checkbox"/> Explain your answers in more detail. <input type="checkbox"/> Carry out revision on Seneca Learning.	<input type="checkbox"/> Revise the equations. <input type="checkbox"/> Check the units on answers. <input type="checkbox"/> Check the correct amount of sig figs on answers. <input type="checkbox"/> Check to convert values correctly. <input type="checkbox"/> Show your full working out. <input type="checkbox"/> Check your calculations. <input type="checkbox"/> Revise the science investigative skills. <input type="checkbox"/> Revise the key concepts of the topics. <input type="checkbox"/> Thoroughly check your work for mistakes. Other:
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Student response



The Periodic Table of Elements

1	2	3	4	5	6	7	0										
7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 C carbon 6	13 Al aluminium 13	14 N nitrogen 7	15 P phosphorus 15	16 O oxygen 8	17 F fluorine 9	18 Ar argon 18								
19 K potassium 19	20 Ca calcium 20	23 Sc scandium 21	24 Ti titanium 22	25 V vanadium 23	26 Cr chromium 24	27 Mn manganese 25	28 Fe iron 26	29 Co cobalt 27	30 Ni nickel 28	31 Cu copper 29	32 Zn zinc 30	33 Ga gallium 31	34 Ge germanium 32	35 As arsenic 33	36 Se selenium 34	37 Br bromine 35	38 Kr krypton 36
39 Rb rubidium 37	40 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[97] Tc technetium	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
55 Cs caesium 55	56 Ba barium 56	139 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	86 Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	104 Rf rutherfordium 104	105 Db dubnium 105	106 Sg seaborgium 106	107 Bh bohrium 107	108 Hs hassium 108	109 Mt meitnerium 109	110 Ds darmstadtium 110	111 Rg roentgenium 111	[285] Cn copernicium	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[293] Ts tennessine 117	[294] Og oganesson 118

1	H	1
	hydrogen	

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted. Relative atomic masses for Cu and Cl have not been rounded to the nearest whole number.



Acknowledgements

This document has been produced by Mr J Turnbull.

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This document has been produced for the AQA GCSE Science Specification.

