

Year 11 Chemistry

Triple Science



Name:	Teacher:
	Chemistry google classroom code:



- In this term we are all going to have to adapt to a new way of learning.
- Lessons will now be a combination of lessons at YDA and online material through google classroom.
- In order to succeed at G.C.S.E you are going to need to be prepared to spend time at home working in order to gain your qualifications.

Our expectations of you:

1. **I follow the school rules about use of google classroom at all times.**
2. **When completing tasks turn off the social media, put the xbox controller away and focus on the work.**
3. **Make sure work is completed to deadlines. If there is a problem let your teacher know before the deadline.**
4. It will be tempting to treat this as homework and therefore try and get the work done quickly. This is not going to help you.
 - a. You need to use your notes/materials in the google classroom to help you complete the work set.
 - b. Don't rush it, spend time trying to learn the work as you complete the tasks.
5. If the task is to prepare some form of written work do not use copy and paste. This simply teaches you to use a mouse.

- a. Read the material and then summarize the information into your own words.
6. If you cannot attend school you will need to complete the online booklets to keep up with the work. We will support you through the google classroom and you can contact us here.
7. Working with a partner is great and will help, copying a partner's work benefits no one. Please make sure the work is your own.

Google classroom checklist -

I know my HWB username and password.	
I know my Google classroom code.	
I know how to find work on the classwork tab.	
I have set up a folder for each of my science subjects in google drive and I know how to save work there. REALLY IMPORTANT FOR REVISION BEFORE EXAMS.	
I know how to submit work	
I know how to send a private message to my teacher through the classroom.	

Lesson 1 - Ionic Bonding

Ionic or Covalent bonding?

To decide whether a chemical substance is ionic or covalent you need to use the periodic table.

Ionic bonding = Metal bonded to non metal.

Example - Sodium chloride.

Covalent Bonding = Made of non metals only.

Example - Chlorine Cl₂ Water H₂O

Student Self-Assessment

Using a copy of the periodic table, decide whether each compound in the table would form an ionic or a covalent bond.

Compound	Ionic or covalent bonding?
Sodium chloride - NaCl	Ionic bonding
Ammonia - NH ₃	
Magnesium oxide - MgO	
Lithium bromide - LiBr	
Carbon dioxide - CO ₂	
Methane - CH ₄	
My score/5	

Answers:
Ammonia = Covalent bonding
Magnesium oxide = Ionic bonding
Lithium bromide = Ionic bonding
Carbon dioxide = Covalent bonding
Methane = Covalent bonding

Drawing diagrams of ionic bonding.

What I need to learn:

1. All atoms react to get a full outer shell of electrons.
2. Metals will lose electrons and non-metals will gain electrons to get a full outer shell.
3. In ionic bonding we use an arrow to show where electrons will move to when a bond is made.
4. When an atom loses electrons it makes a +ve ion.
5. When an atom gains electrons it makes a -ve ion.



Year 10 Skills check - Electronic structure.

For each of the elements in the table write the electronic structure and decide if it will gain or lose electrons when it reacts to make an ionic bond.

<u>Element</u>	<u>Electronic structure</u>	<u>Gain or lose electrons when it forms an ionic bond?</u>	<u>Ion formed</u>
Sodium	2,8,1	Lose 1 electron	1+
Oxygen			
Magnesium			
Nitrogen			
Fluorine			

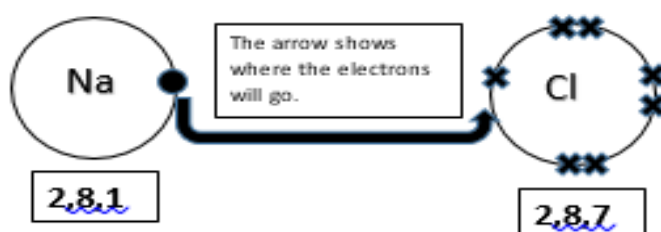
Example of what to do:

The question: Draw a *dot and cross diagram* to show the bonding in sodium chloride.

Step 1 - First decide if this is ionic (metal + non-metal) or covalent (non-metals).

Step 2

- If it is IONIC BONDING then we need to draw a diagram showing where the electrons are at the start of the reaction.
- We only draw the electrons in the OUTER SHELL.
- We use arrows to show where the electrons will go.

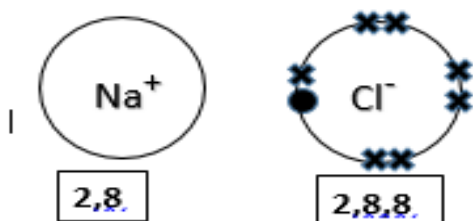


- Sodium has 11 electrons so we would write this as 2, 8, 1.
- We only draw the outer shell so this has 1 electron.
- Sodium will lose this electron to get a full outer shell (The one underneath is full.)

- Chlorine has 17 electrons so we would write this as 2, 8, 7.
- We only draw the outer shell so this has 7 electrons.
- Chlorine will gain electrons to get a full outer shell.

Step 3

- We now need to draw ANOTHER DIAGRAM (this is the one most students forget to draw in the exam.)
- In this diagram we show where the electrons have moved to and the IONS THAT FORM.

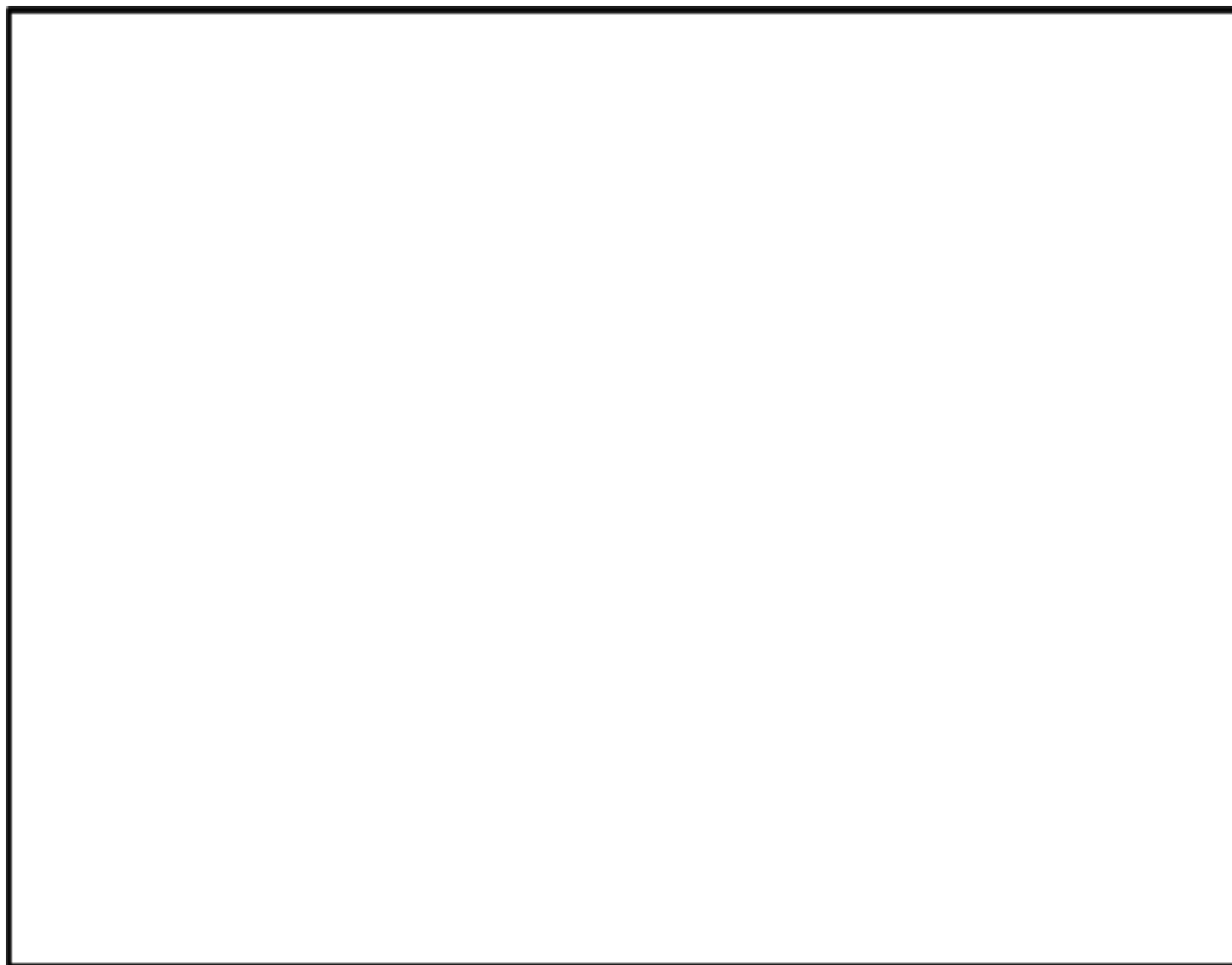


IMPORTANT POINTS TO SPOT:

1. Both Na and Cl now have FULL OUTER SHELLS.
2. The electronic structures shown in the boxes have changed to show this.
3. **IONS** have now been made:
Na = + (lost one electron)
Cl = - (gained 1 electron)

Student Self-Assessment

Draw a dot and cross diagram to show the bonding in lithium fluoride.

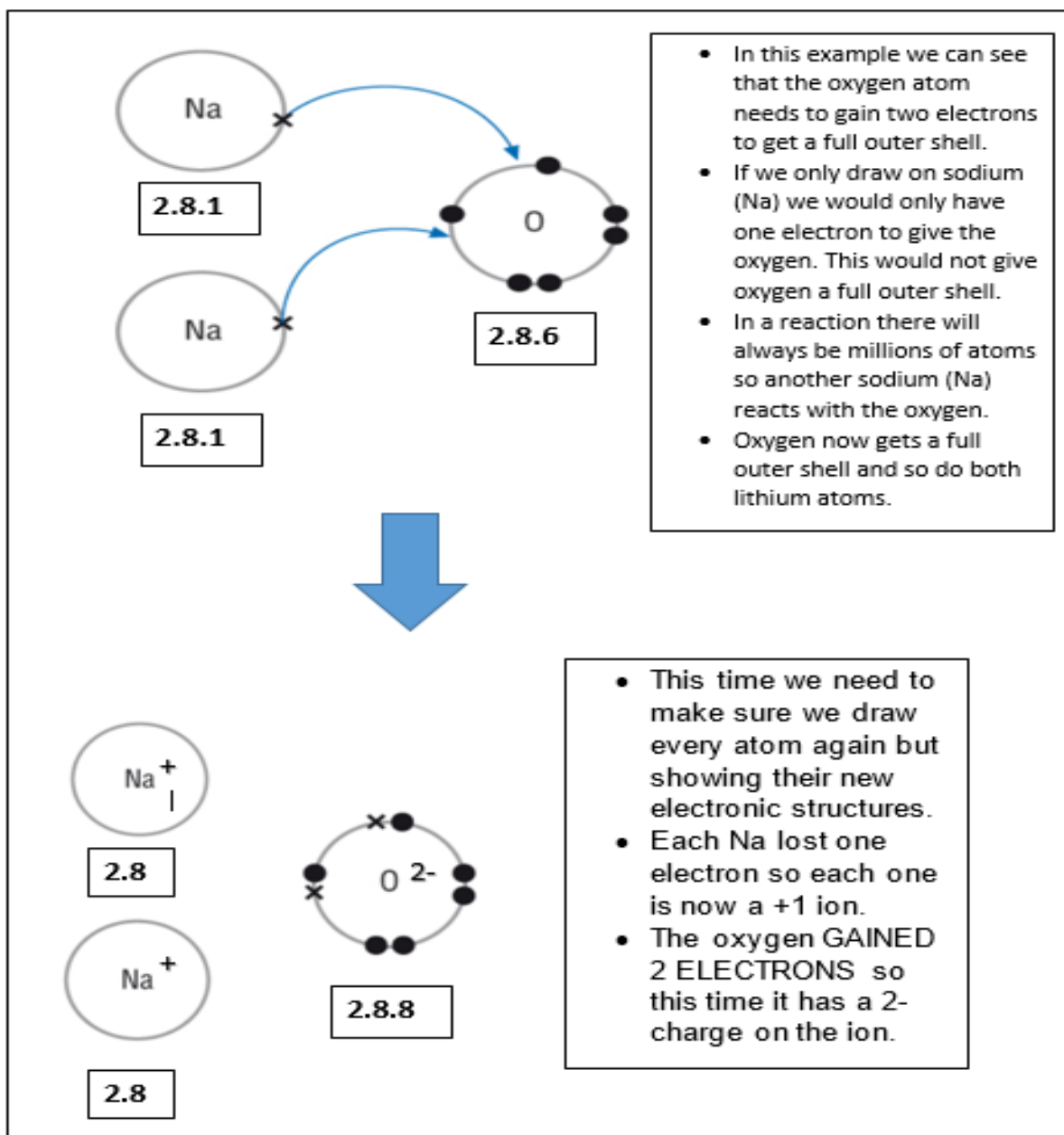


Success criteria for drawing ionic bonding diagram	Correct  Target 
<i>Correct electronic structures at the start.</i>	
<i>Arrow showing where the electrons will move to.</i>	
<i>Second diagram of atoms with new electronic structures.</i>	
<i>Ions added with correct charge.</i>	

Harder examples: In the examples we have seen so far we have only needed one of each atom to make full outer shells.

You may need to use MORE THAN ONE ATOM in a reaction to make full outer shells as this example shows.

Question: Draw a dot and cross diagram to show the bonding in sodium oxide.



Student Self-Assessment

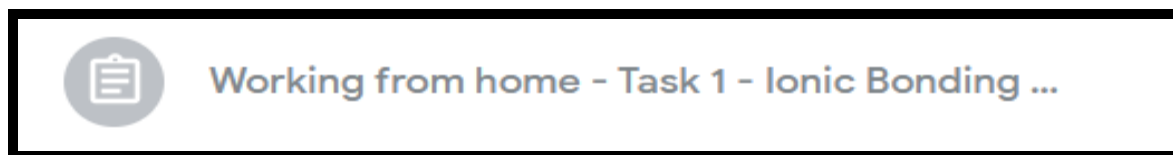
Draw a dot and cross diagram to show the bonding in magnesium chloride.

Success criteria for drawing ionic bonding diagram	Correct  Target 
<i>Correct electronic structures at the start.</i>	
<i>Arrow showing where the electrons will move to.</i>	
<i>Second diagram of atoms with new electronic structures.</i>	
<i>Ions added with correct charge.</i>	



Working from Home Task 1 - Ionic Bonding

By the time you return to your next chemistry lesson you need to complete the following quiz in the google classroom.



https://docs.google.com/forms/d/1-ofJFLVqHgQLWJjFsyPnTR8zTKx3UCn_RWNfyO_AueM/edit

<i>My quiz score:</i>	
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Corrections:

If you make any errors in the quiz record the correct answers in this table.

These are things you NEED TO LEARN!!!!

<i>Question number</i>	<i>Correction/error I made</i>

Working from home task 2 - Past Paper questions

Instructions:

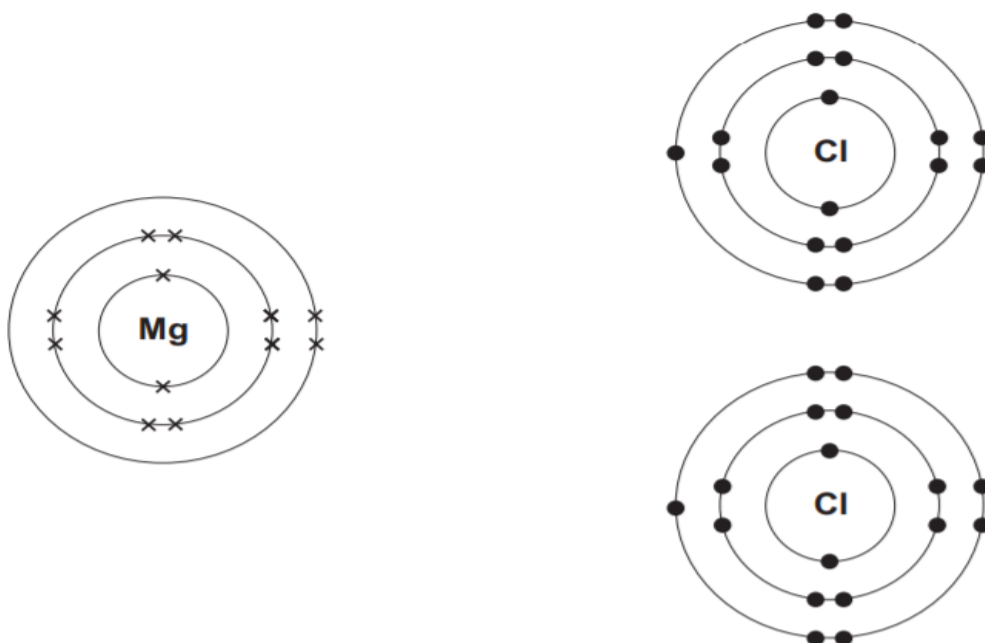
If you are attempting these at home on a computer and need to draw a diagram, complete these on a piece of paper and take a picture of the answers using your phone.

How to do this: Attach the picture to the doc by clicking on insert on the top tool bar, then image and finally camera.

Question 1:

- (a) Magnesium reacts with chlorine to form magnesium chloride.

The following diagram shows the electronic structures of magnesium and chlorine atoms.



- (i) Draw arrows on the diagram to show how electrons are transferred between the magnesium and chlorine atoms during the formation of magnesium chloride. [1]

(ii) Complete the table by giving information about the charge and electronic structure of the magnesium and chloride ions formed.

Ion	Electronic structure	Charge on ion
Magnesium		+2
Chloride	2,8,8	

Question 2

(a) Sodium reacts with oxygen to give sodium oxide.

(i) Using the electronic structures below, draw dot and cross diagrams to show the transfer of electrons and the formation of ions that occur as sodium oxide is formed.

[3]

sodium 2,8,1

oxygen 2,6

b) Give the electronic structures of the sodium ion and the oxide ion formed at the end of the reaction in part (a). [2]

<i>Ion</i>	<i>Electronic structure</i>
<i>Sodium</i>	
<i>Oxide</i>	

Lesson 2 - Covalent Bonding

Drawing diagrams of covalent bonds:

What I need to learn:

1. All atoms react to get a full outer shell of electrons.
2. When drawing covalent diagrams we need to share electrons. We show this by drawing overlapping rings.
3. A covalent bond is made when a PAIR of electrons are in an overlapping ring.
4. If you have drawn the correct diagram then the formula should match the number of atoms in the diagram.

Example of what to do:

The question: Draw a dot and cross diagram to show the bond in hydrochloric acid (HCl). Hydrogen = 1 Chlorine = 2,8,7

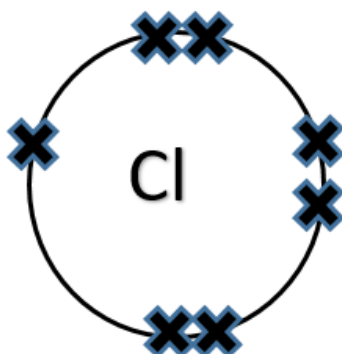
Step 1 - Quick check to see whether you are drawing an ionic or a covalent diagram.

In this example H and Cl are both non-metals so this is a covalent diagram.

Step 2 - Look at the formula to see how many of each atom you can draw.

In this example you can draw 1 H and 1 Cl.

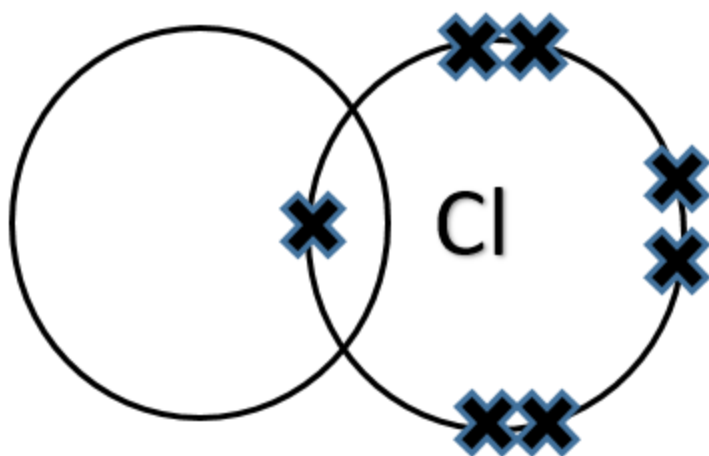
Step 3 - Draw the atom with the most electrons on the last shell first. Remember you only need to draw the outer electrons.



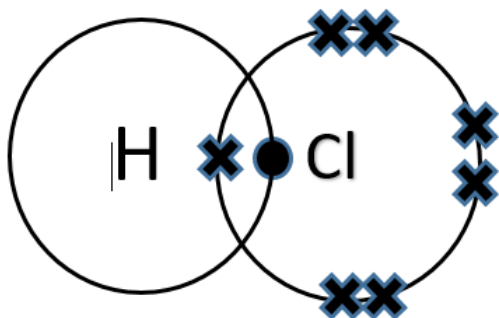
Step 4 - Look for where there are unpaired electrons. In this example we can see that Cl needs 1 electron to get a full outer shell and that's why we have 1 unpaired electron.

Step 5 - **Where there's a gap overlap.**

We are now going to draw an overlapping ring covering the gap where an electron is needed by Cl.



Step 6 - Add the electrons on the other atom. In this example the other atom is H and it only has 1 electron. This one has to share with Cl so it goes in the overlap.



Final checks - The formula = HCl as we have drawn 1 H and 1 Cl then we know we have the correct diagram.

A covalent bond is made when two atoms **SHARE** a **PAIR** of **ELECTRONS**.

In an exam you may get asked to count the number of covalent bonds in a diagram.

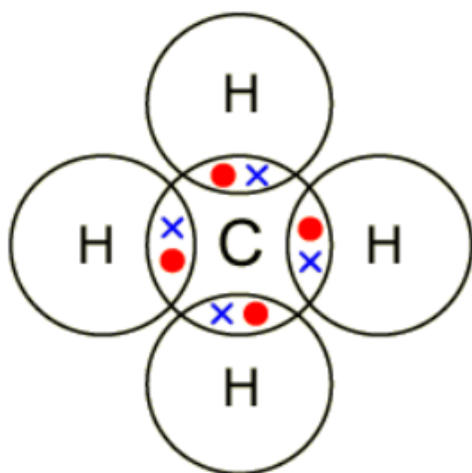
Student
Self-Assessment+

Draw a dot and cross diagram to show the bonding in chlorine Cl₂.

Cl = 2,8,7

Student Self-Assessment

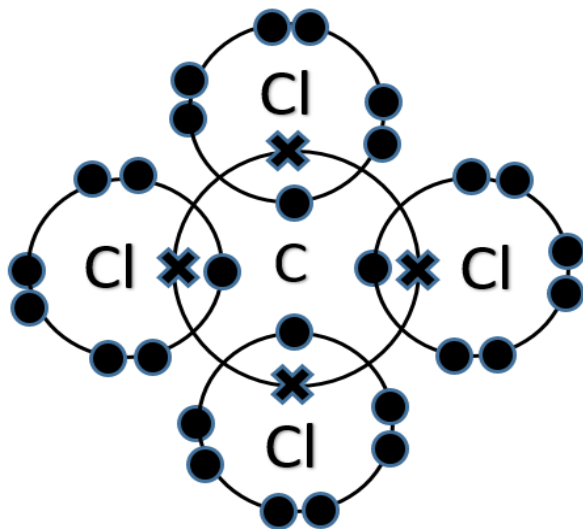
How many covalent bonds does carbon form in this compound?

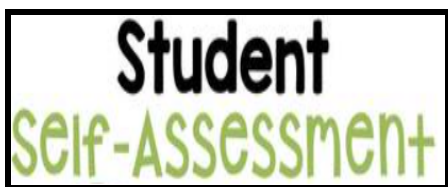


Carbon has formed covalent bonds.

A harder example

Draw a dot and cross diagram to show the bonding in CCl_4 . $\text{C} = 2,4$ $\text{Cl} = 2,8,7$





Draw a dot and cross diagram to show the bonding in ammonia NH_3 .

N = 2,8,5 H = 1

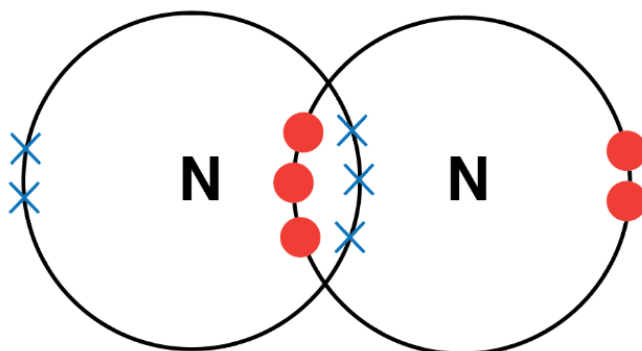
Higher tier only!

Double and triple bonds

Some molecules contain a double bond, which consists of two shared pairs of electrons. For example, oxygen molecules consist of two oxygen atoms joined together. Oxygen atoms can form two covalent bonds, so to link the two oxygen atoms together, a double bond forms.

Name	Formula	Dot and cross diagram	Structure
Oxygen	O_2		$\text{O}=\text{O}$
Carbon dioxide	CO_2		$\text{O}=\text{C}=\text{O}$

Nitrogen molecules consist of two nitrogen atoms joined together. Nitrogen atoms can form three covalent bonds, so a triple bond forms between them. The structure of nitrogen is $\text{N}\equiv\text{N}$, showing that it has three shared pairs of electrons.





Task 1 - Past Paper Questions

Question 1

Using the electronic structures below, draw a dot and cross diagram to show the bonding in a molecule of sulfur difluoride, SF_2 . [2]

sulfur = 2,8,6

fluorine = 2,7

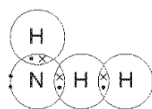
Question 2

- (a) (i) Ammonia, NH_3 , is a compound that contains the elements nitrogen and hydrogen. The electronic structure for each element is given below.

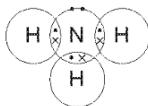
N 2,5

H 1

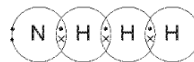
State which of the following dot and cross diagrams, A, B or C, represents the bonding in a molecule of ammonia. [1]



A



B

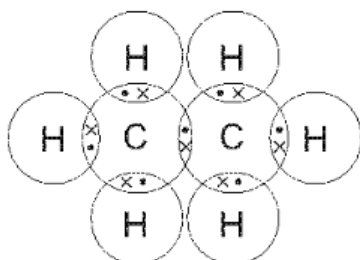


C

<u>Letter</u>	
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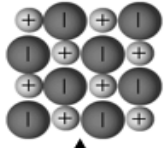
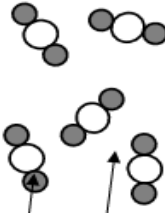
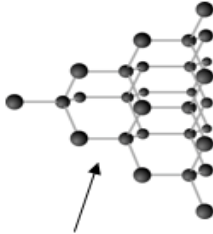
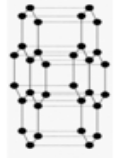
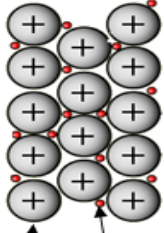
Question 3

The dot and cross diagram for a molecule of ethane is given below:



- a) How many atoms are there in this molecule of ethane? [1]
..... atoms
- b) What is the formula of ethane? [1]
Formula =
- c) How many covalent bonds does **each** carbon atom form? [1]
..... Bonds

Task 2 - Use the revision summary below to help you complete the quiz on structures.

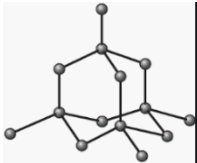
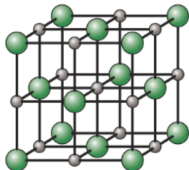
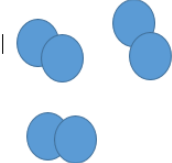
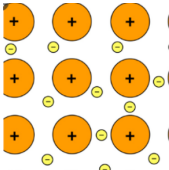
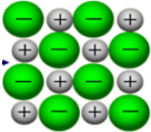
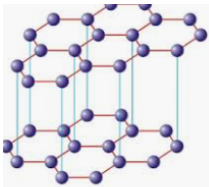
Structure	Properties	Explanation
Giant ionic structure 	High melting points and boiling points. Do not conduct electricity as solids. Conduct electricity as liquids/solutions.	The strong electrostatic forces between positive and negative ions require lots of energy to overcome. Solid: the ions are in fixed positions. Liquid/solution: The ions are free to move.
Simple molecular structure 	Low melting and boiling points. Do not conduct electricity.	Although the covalent bonds between the atoms in molecules are strong, the intermolecular forces between the molecules are weak and little energy is needed to overcome them. The molecules are neutral so there are no moving charges.
Giant covalent/macromolecular structure <u>Diamond</u> 	High melting and boiling points. Does not conduct electricity	There are strong covalent bonds throughout the structure which require lots of energy to overcome. All of the electrons are fixed in covalent bonds so they cannot flow/move and carry electricity.
Giant covalent/macromolecular structure <u>Graphite</u> 	High melting and boiling points Conducts electricity Soft/lubricant	There are strong covalent bonds throughout the structure which require lots of energy to overcome. There are delocalised electrons between the layers. These electrons can move freely and carry electricity. The weak forces between the layers can break easily and slide over one another.
Metallic structure 	High melting and boiling points. Conductor of heat and electricity	The strong electrostatic forces between positive ions and delocalised electrons require lots of energy to overcome. There are delocalised electrons that can carry heat and electrical charge.

Lesson 3 - Giant Structures.

Student
Self-Assessment+

Task 1 - Identify structures.

In the table name each of the structures.

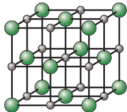
Name of structure	Diagram of structure
	
	
	
	
	
	

Task 2 - Identify the structure in each of the chemical substances in the table below.

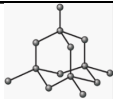
Chemical substance	Name of structure
Graphite	Giant covalent
Iron	
Water	
Diamond	
Lithium fluoride	

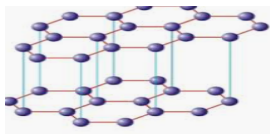
Properties

Use the slides to complete each of these summaries.

<u>Giant ionic structures</u> 	
<u>Property</u>	<u>Explanation</u>

Giant Covalent Structures:

<u>Diamond</u> 	
<u>Property</u>	<u>Explanation</u>

<u>Graphite</u> 	
<u>Property</u>	<u>Explanation</u>



Task 1 - Use the slides on google classroom to complete the revision summaries for metallic and simple molecular structures.

Metallic structure

<u>Property</u>	<u>Explanation</u>

Simple molecular structure

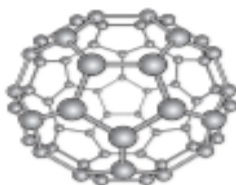
<u>Property</u>	<u>Explanation</u>



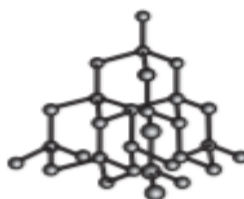
Past Paper question on special materials.

1

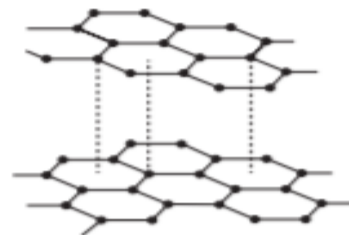
Fullerene, diamond and graphite are different forms of carbon.



fullerene



diamond



graphite

(i) Underline the structure of these three forms of carbon.

[1]

simple molecular

giant covalent

giant ionic

(ii) The box shows some properties of different forms of carbon.

transparent	insoluble in water	conducts electricity
hollow	soft	does not conduct electricity
		hard

Complete the table by choosing the property which makes the different forms of carbon suitable for the uses shown.

[3]

Form of carbon	Use	Property
diamond	drill bits	
graphite	pencils	
fullerene	drug delivery	

2

Nano-silver particles can be used in socks, plasters and disinfectant sprays.

Explain why nano-silver is suitable for use in these examples and state why some people are concerned about the use of nanoparticles in everyday life. [3]