

Home learning activities

Subject
Science
Year Group
Year 7
Unit of work / Knowledge organiser
Atoms, Elements and Compounds - 2
Activities
<ul style="list-style-type: none"> Complete the 'Knowledge Check' by clicking on the link below (Mr Tobi has also emailed this link out to you): <p>https://forms.office.com/Pages/ResponsePage.aspx?id=tWaUKrjGMEuM3bZvypd0-1JR5WsjulFPvbjl4VXu0Y1UQkpiUVE2WDNBNkVHUEFGROtLNVJXUzhHUi4u</p> <ul style="list-style-type: none"> Read through the Sections 4-7a of the 'Knowledge Organiser' on 'Compounds' (the second page). Make careful and detailed notes on Sections 4-7a, including writing out the 'properties' sentences in Sections 5b, 6a and 6b. Describe what 'graphene' is, and what it can be used for, without looking at your earlier notes from Section 7a. Learn the meanings of the key words from the 'Atoms, Elements and Compounds Keywords' sheet and complete the key words from memory on the 'Keywords Test' sheet. Work out your score using the first sheet. Complete the 'How Many?', 'Match and Draw' and 'What Am I?' activities on the 'Test Yourself' pages; the answers are provided at the end, but do not look at these until you have tried to complete the work yourself (be strict with yourself here).
Where do you complete the work?
In Study Books.
What to do if you finish the work? (Extension activity)
<ul style="list-style-type: none"> Make sure you have completed the previous set work on 'Atoms, Elements and Compounds – 1' and then continue with all sections of the 'Mini Project' on 'Atoms, Elements and Compounds'.

These websites might help:

- BBC Bitesize -> Secondary -> KS3 -> Science -> Chemistry -> Atoms, Elements and Compounds

If you are struggling with your work or if you have finished.

Please email your classroom teacher directly using the email list found in the Home Learning section of the website.

Yr 7 Compounds

1. Formation of ions based on the periodic table

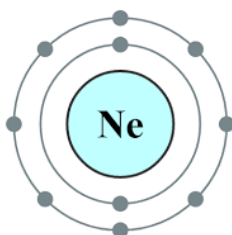
Ions – are charged particles formed from the gaining or losing of outer electrons.

Metal atoms **LOSE** outer electrons they become **POSITIVELY** charged

Non- metal atoms **GAIN** outer electrons they become **NEGATIVELY** charged.

	Group 1 metals LOSE 1 electron BECOME 1+ ion
	Group 2 metals LOSE 2 electrons BECOME 2+ ion
	Group 6 non-metals GAIN 2 electrons Become 2- ions
	Group 7 non-metals GAIN 1 electron Become 1- ions

All atoms do this to gain the electronic configuration of the noble gas (group 0) of:



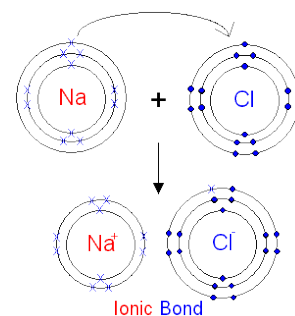
2. Ionic Bond

Metal – donates outer electrons

Non-metal – receives outer electrons to gain a full outer shell.

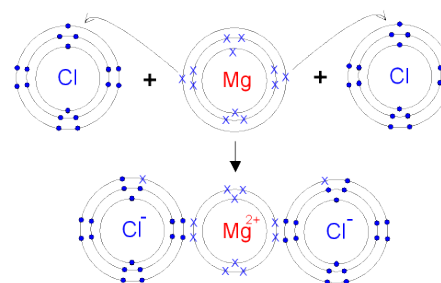
When a metal atom reacts with a non-metal atom electrons in the outer shell of the metal atom are **transferred**.

Making sodium chloride



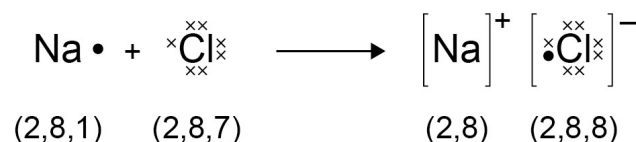
Formula - NaCl

Making magnesium chloride



Magnesium needs to lose 2 outer electrons. Each chlorine receives an outer electron to give the Formula $MgCl_2$

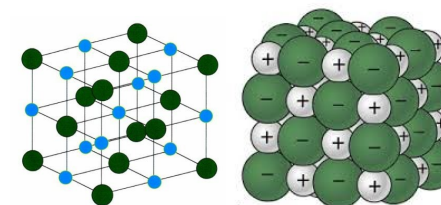
The electron transfer can be represented by simple dot and cross diagrams.



3. Properties of ionic compounds

Remember to gain higher marks you need to link the property of the compound to its bonding and structure.

The structure of sodium chloride can be shown as:



Regular structure (giant ionic) produced by strong electrostatic forces of attraction between oppositely charged ions.

They have high melting and boiling points because a high amount of energy is needed to break the many strong ionic bonds.

They dissolve in water because water has polarity and attracts the oppositely charged ions.

When dissolved in water or molten they conduct electricity because the ions are free to move – allowing charge to flow.

Working out the empirical formula of ionic compounds from a given model

Empirical formula is the simplest ration of ions in the compound.

Sodium chloride is NaCl (1:1)

Magnesium chloride is $MgCl_2$ (1:2)

Magnesium oxide MgO (1:1)

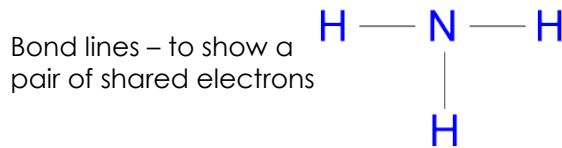
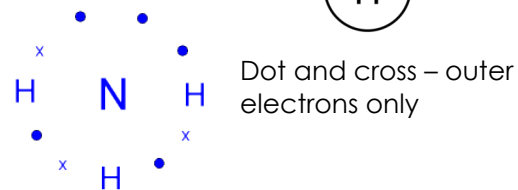
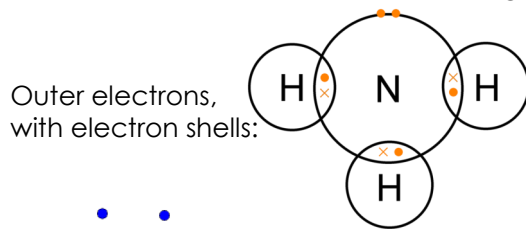
Sodium oxide is Na_2O (2:1)

Yr 7 Compounds

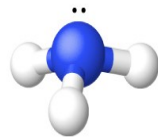
4. Covalent Bonding

Formed when 2 or more **non-metals share pairs of electrons** on their outer shells.

The covalent bonds in molecules and giant structures can be represented in the following forms

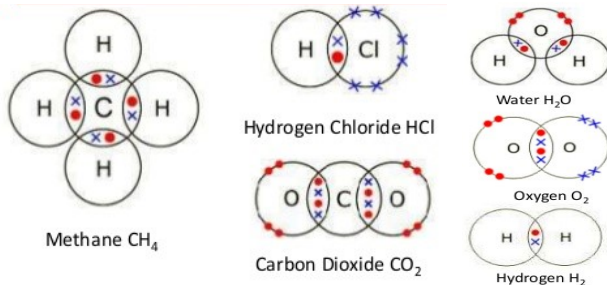


Or as a stick and ball model:



5a. Simple Covalent compounds

These are the structures of the common simple covalent compounds.



5a. The examiner may ask you to draw different ones.

Remember

use the periodic table to find out how many outer electrons each atom has; All electrons need to be paired and shared.

5b. Properties of simple covalent compounds

Low melting and boiling points - This is because the weak intermolecular forces break down easily. Simple molecular substances are gases, liquids or solids with low melting and boiling points.

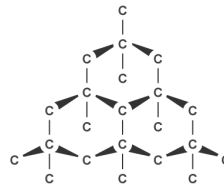
Non-conductive - Substances with a simple molecular structure do not conduct electricity. This is because they **do not** have any **free electrons** or an overall electric charge (ions).

Hydrogen, ammonia, methane and water are also simple molecules with covalent bonds. All have **very strong bonds between the atoms**, but much **weaker forces holding the molecules together**. When one of these substances melts or boils, it is these weak 'intermolecular forces' that break, not the strong covalent bonds.

6a. Giant covalent compounds and the properties

Allotropes of carbon

Diamond



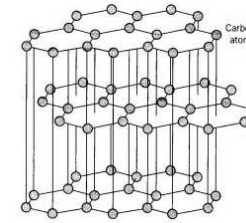
Properties

High melting and boiling point – all carbons have 4 strong covalent bonds which required extremely high temperatures to break. (NO intermolecular forces)

Non-conductive as it does not have free electrons or ions.

Extremely hard due to covalent bonds.

6b. Graphite



Properties

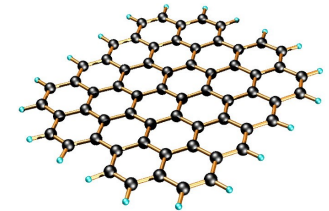
High melting and boiling point – all carbons have 3 strong covalent bonds which required extremely high temperatures to break.

Conducts electricity – it has delocalised electrons.

Layers are weakly attracted meaning they can slide over each other useful as a lubricant.

7a. Graphene

Graphene is a smart material, because it is only one atom thick. Graphene is essentially a single layer of carbon in the form of graphite, with its layered structure of hexagonal rings of



Graphene fibres are strong. Graphene is highly resistant to attack by strong acids or strong alkalis and so can be used to give surfaces an ultra-thin protective layer which is transparent

Atoms, Elements & Compounds Keywords

Q	Words	Explanation
1	atom	A particle that can exist alone and that is smaller than any other.
2	carbon dioxide	The gas that green plants need to produce their food and that both animals and plants produce by respiration. It turns limewater milky white.
3	chlorine	A toxic greenish-yellow gas. In nature usually found combined with Sodium. Chemical symbol is Cl.
4	element	A substance that cannot be broken down into simpler substances. It consists of only one type of atom.
5	compound	A substance formed from two or more elements chemically combined.
6	Noble gases	The elements that do not react chemically with other elements. They are found in air in small quantities, e.g. helium, argon, neon. They are also called the Inert gases.
7	symbol	A letter or two letters which stand for one atom of an element.
8	equation	A written way of showing the reactants and products in a chemical reaction.
9	state	There are three of these - solid, liquid and gas.
10	silver	Unreactive metal used to make jewellery. Chemical symbol Ag.
11	conductor	Allows heat and electricity through it. Opposite of insulator.
12	molecule	A group of atoms combined together. The atoms are joined by chemical bonds.
13	helium	Unreactive gas with chemical symbol He.
14	groups	The vertical columns of the Periodic Table
15	periods	The horizontal rows of the Periodic Table
16	oxygen	A colourless gas with no smell. Things always burn better in this gas. It is also essential to the breathing process and aerobic respiration.
17	metals	This is the group to which most elements belong. They are generally hard, shiny elements and conduct electricity well.
18	pure	Consisting of a single substance. It is p_____.
19	magnetic	Iron, nickel and cobalt are all _____ metals
20	sodium chloride	A water soluble compound made from a toxic gas and a soft metal. We need it in our diet and the sea contains lots of it. Formula is NaCl.

Atoms, Elements & Compounds Keywords Test

Q	Words	Explanation
1		A particle that can exist alone and that is smaller than any other.
2		The gas that green plants need to produce their food and that both animals and plants produce by respiration. It turns limewater milky white.
3		A toxic greenish-yellow gas. In nature usually found combined with Sodium. Chemical symbol is Cl.
4		A substance that cannot be broken down into simpler substances. It consists of only one type of atom.
5		A substance formed from two or more elements chemically combined.
6		The elements that do not react chemically with other elements. They are found in air in small quantities, e.g. helium, argon, neon. They are also called the Inert gases.
7		A letter or two letters which stand for one atom of an element.
8		A written way of showing the reactants and products in a chemical reaction.
9		There are three of these - solid, liquid and gas.
10		Unreactive metal used to make jewellery. Chemical symbol Ag.
11		Allows heat and electricity through it. Opposite of insulator.
12		A group of atoms combined together. The atoms are joined by chemical bonds.
13		Unreactive gas with chemical symbol He.
14		The vertical columns of the Periodic Table
15		The horizontal rows of the Periodic Table
16		A colourless gas with no smell. Things always burn better in this gas. It is also essential to the breathing process and aerobic respiration.
17		This is the group to which most elements belong. They are generally hard, shiny elements with high melting and boiling points. They all conduct electricity and heat well.
18		Consisting of a single substance. It is p_____.
19		Iron, nickel and cobalt are all _____ metals
20		A water soluble compound made from a toxic gas and a soft metal. We need it in our diet and the sea contains lots of it. Formula is NaCl.

Atoms, Elements and Compounds

Test Yourself

How Many?

For the following compounds list the number of atoms.

Name of compound	Number of atoms		
CO ₂	C-	O-	
H ₂ SO ₄	H-	S-	O-
CO	C-	O-	
CaCO ₃	Ca-	C-	O-

Match and Draw

Match the compound with its symbol.

Carbon dioxide	CuCO ₃	Sulphuric acid	H ₂ SO ₄
Hydrochloric acid	CO ₂	Magnesium oxide	NaI
Copper carbonate	HCl	Sodium iodide	MgO

What Am I?

- I am made up of 1 type of element only and I am carried by the red blood cells.

- I am a compound and a gas, I am one of the body's waste products and you breathe me out.

- When I am burnt, I burn with a very bright white light and your teacher will ask you not to look directly at me.

- I am a mixture of nitrogen, carbon dioxide, oxygen, argon and water vapour.

Atoms, Elements and Compounds

Test Yourself Answers

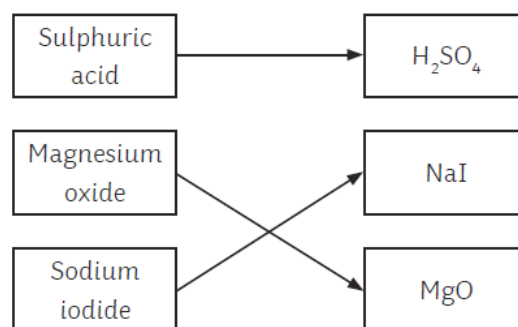
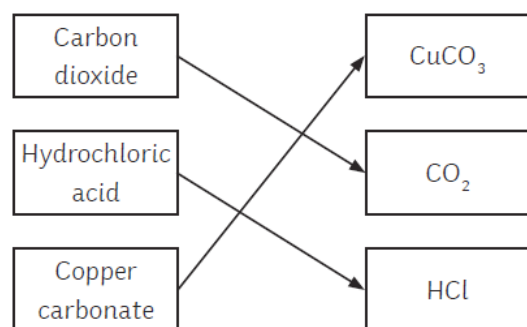
How Many?

For the following compounds list the number of atoms.

Name of compound	Number of atoms		
CO ₂	C-1	O-2	
H ₂ SO ₄	H-2	S-1	O-4
CO	C-1	O-1	
CaCO ₃	Ca-1	C-1	O-3

Match and Draw

Match the compound with its symbol.



What Am I?

- I am made up of 1 type of element only and I am carried by the red blood cells. **Oxygen**
- I am a compound and a gas, I am one of the body's waste products and you breathe me out. **Carbon dioxide**
- When I am burnt, I burn with a very bright white light and your teacher will ask you not to look directly at me. **Magnesium**
- I am a mixture of nitrogen, carbon dioxide, oxygen, argon and water vapour. **Air**

Atoms, Elements and Compounds

Watch this video: <https://www.youtube.com/watch?v=nxRGahK7B48>

Task	Description
1	Create a decorative cover sheet for your project using pictures and as many keywords from the topic as possible.
2	Draw or print a table to show the similarities and the differences between man-made and natural materials, also include three examples for each
3	Produce a leaflet to show a diagram of atoms of an element such as iron or zinc
4	Draw or print the periodic table and label the sections of metals and the non-metals .Label and name the groups of the periodic table
5	Draw or print a table for ten metal elements with their symbols and ten non-metal elements with their symbols
6	Find the definition of a compound and write down he names of three compounds and state the difference between a compound and a mixture
7	Draw a poster to show the difference between chemical and physical changes. Include an example for each. State how to identify a chemical change.
8	Name different compounds and molecules and list the rules for naming compounds with examples for each.