SMITH'S WOOD ACADEMY

Home learning activities

Subject
Science
Year Group
Year 7
Unit of work / Knowledge organiser
Atoms, Elements and Compounds - 1
Activities
• Complete the 'Knowledge Check' by clicking on the link below (Mr Tobi has also emailed this link out to you): https://forms.office.com/Pages/ResponsePage.aspx?id=tWaUKrjGMEuM3bZvypd0-1JR5WsjuLFPvbjl4VXu0Y1URjFCMjFHSlpPREtXNEoyQk1GTEU1OURYUi4u • Read through the Sections 1-3 of the 'Knowledge Organiser' on 'Compounds'. • Make careful and detailed notes on Sections 1-3, including writing out the 'properties of ionic compounds' in Section 3. • Describe what happens to metals and non-metals during 'ionic bonding' your own words, without looking at your earlier notes from Section 2. • Read the 'Key Revision Facts' sheet carefully. • Describe, in your own words, the meanings of the terms 'elements', 'molecules' and 'compounds' without looking at the 'Key Revision Facts' sheet. • Complete the 'Match and Draw', 'True or False?' and 'Model Drawing' activities on the 'Test Yourself 1' 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)
• Make sure you have completed the previous set work on 'Acids and Alkalis' and complete the 'Mini Project' on 'Atoms, Elements and Compounds'.

SMITH'S WOOD ACADEMY

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

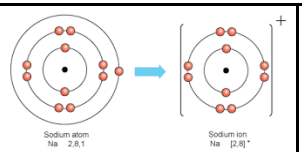
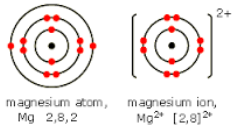
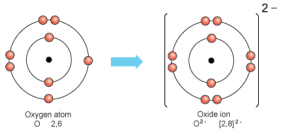
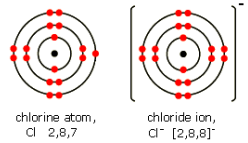
SMITH'S WOOD ACADEMY

1. Formation of ions based on the periodic table

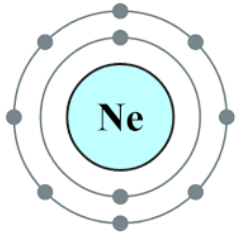
Ions – are charged particles formed from the gaining or losing of outer electrons.

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:



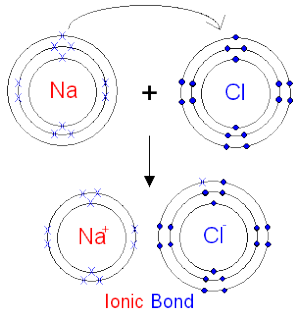
2. Ionic Bond

Metal – donates outer electrons

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

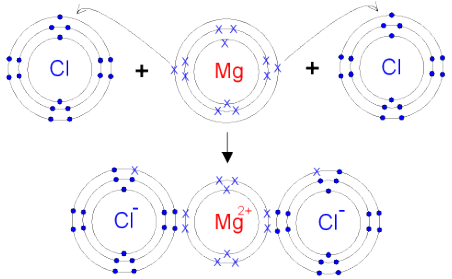
When a metal atom reacts with a non-metal atom electrons in the outer shell of the metal atom are **transferred.**

Making sodium chloride



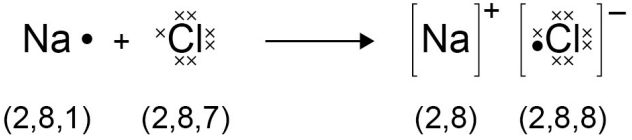
Formula - NaCl

Making magnesium chloride



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

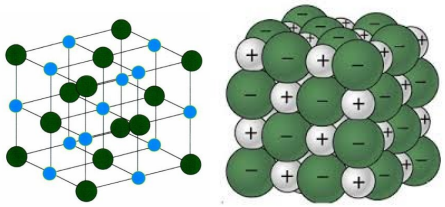
The electron transfer can be represented by simple dot and cross diagrams.



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

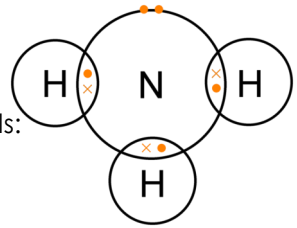
SMITH'S WOOD ACADEMY

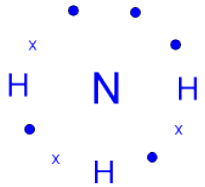
4. Covalent Bonding

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

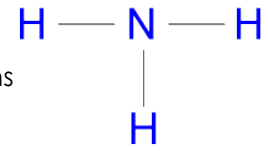
Outer electrons, with electron shells:



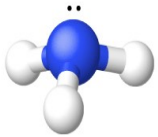


Dot and cross – outer electrons only

Bond lines – to show a pair of shared electrons

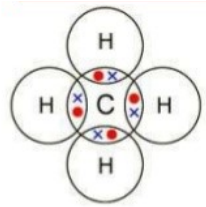


Or as a stick and ball model:

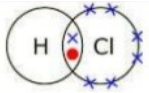


5a. Simple Covalent compounds

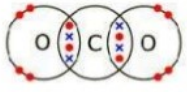
These are the structures of the common simple covalent compounds.



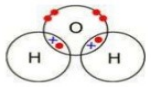
Methane CH_4



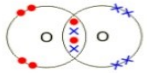
Hydrogen Chloride HCl



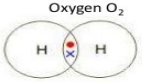
Carbon Dioxide CO_2



Water H_2O



Oxygen O_2



Hydrogen H_2

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.

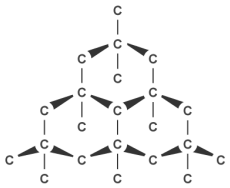
Non-conductive - Substances with a simple molecular structure do not conduct electricity. This is because they **do not** have any free electrons or an overall electric charge (ions).

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



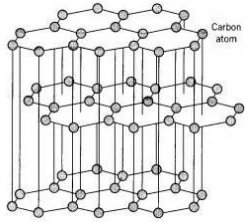
Properties

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

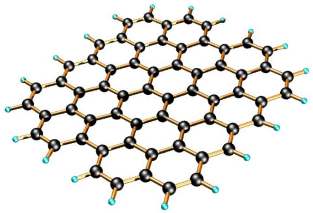
High melting and boiling point – all carbons have 3 strong covalent bonds which required extremely high temperatures to break.

Conducts electricity – it has delocalised electrons.

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

7a. Graphene

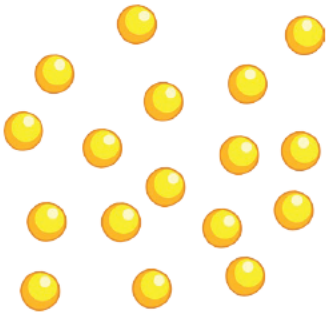
Graphene is a smart material, because it is only one atom thick. Graphene is essentially a single layer of carbon in the form of graphite, with its layered structure of hexagonal rings of



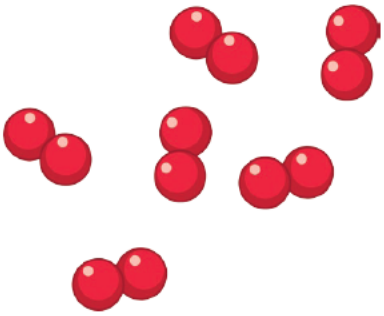
Graphene fibres are strong.
Graphene is highly resistant to attack by strong acids or strong alkalis and so can be used to give surfaces an ultra-thin protective layer which is transparent

Atoms, Elements and Compounds **Key Revision Facts**

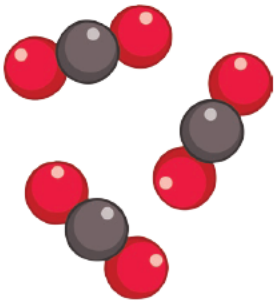
- An element contains one type of atom only.
- A molecule is a group of atoms chemically bonded together. Atoms could be of the same element, or different elements.
- A compound contains 2 or more elements chemically combined.



Element



Molecule



Compound

- Elements have both a symbol and a name, for example oxygen O, sodium Na, carbon C.
- An atom is the smallest part of an element.
- Some common compounds are: sodium chloride NaCl, water H_2O, and carbon dioxide CO_2.
- Sulphuric acid H_2SO_4 contains:
  2 hydrogen atoms;
  1 sulphur atom;
  4 oxygen atoms.

Atoms, Elements and Compounds

Test Yourself 1

Match and Draw

Match the symbol with its name:

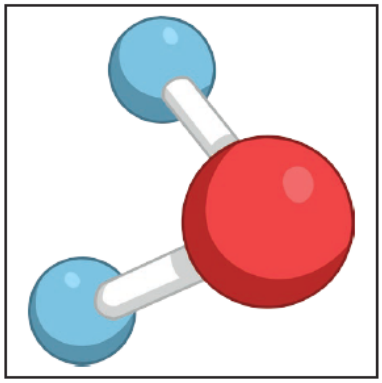
Fe	Gold	C	Potassium
Au	Iron	K	Calcium
Ag	Silver	Ca	Carbon

True or False?

- Water is an element. _____
- Carbon dioxide is a compound. _____
- A compound can only contain 2 elements chemically combined. _____
- There are about 120 elements that can be found on the periodic table. _____
- All the elements were found at the same time. _____

Model Drawing

A model of water is shown below, can you draw similar models for carbon dioxide and sulphur dioxide.



Water

Carbon dioxide

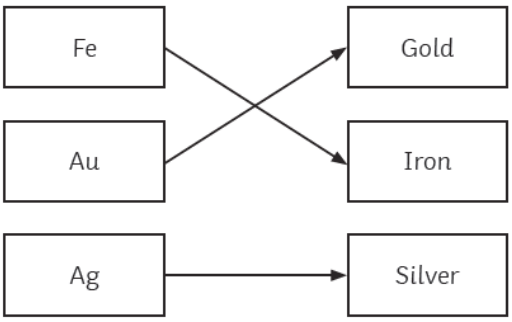
Sulphur dioxide

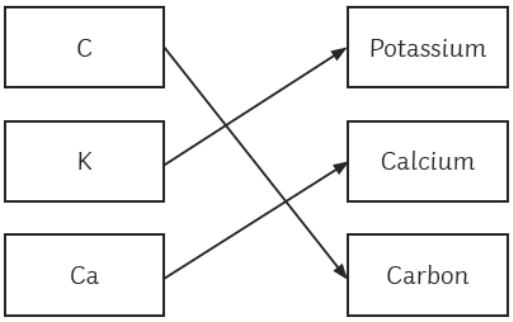
Atoms, Elements and Compounds

Test Yourself 1 Answers

Match and Draw

Match the symbol with its name:



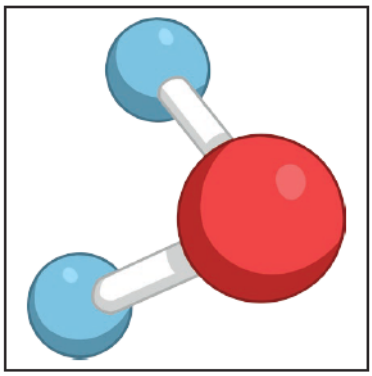


True or False?

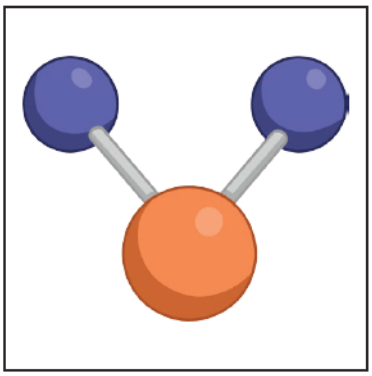
- Water is an element. **False**
- Carbon dioxide is a compound. **True**
- A compound can only contain 2 elements chemically combined. **False**
- There are about 120 elements that can be found on the periodic table. **True**
- All the elements were found at the same time. **False**

Model Drawing

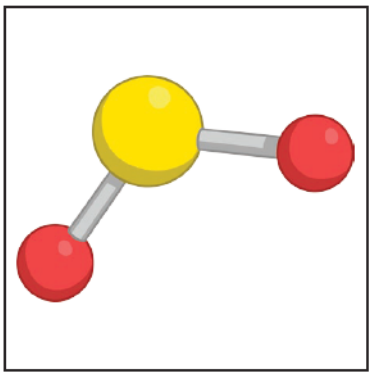
A model of water is shown below, can you draw similar models for carbon dioxide and sulphur dioxide.



Water



Carbon dioxide



Sulphur dioxide

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.