SMITH'S WOOD ACADEMY

Home learning activities

Subject
Science
Year Group
Year 10
Unit of work / Knowledge organiser
Further Bonding and Structure – Final Week
Activities
• Complete the weekly 'Knowledge Check' through 'GCSEPod'. • Watch all 'GCSEPod' clips on the 'Bonding and Structure' Unit. • Complete the 'GCSEPod' Questions assigned for this Unit of work and any additional assignments which have been set by your teacher. • Follow the 'Revision Plans' for Biology and Physics • Complete the assigned activities for the given week on the Biology and Physics revision plans
Where do you complete the work?
Use computer/phone for 'GCSEPod' or 'Seneca' and study materials.
What to do if you finish the work? (Extension activity)
• Sign up for 'Seneca Learning' using the 'Sign Up Guide' sheet and the special passcode: **j5v9tvzq48**. Complete the assignments which have been set.
These websites might help:
• BBC Bitesize -> Secondary -> GCSE -> Combined Science -> AQA Trilogy -> Chemistry -> Bonding, Structure and the Properties of Matter • www.freesciencelessons.co.uk -> GCSE Videos -> Chemistry Paper 1 -> Structure and Bonding
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.

Year 10 — Bonding and Structure

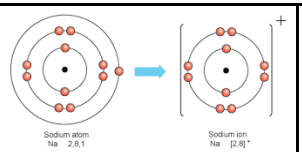
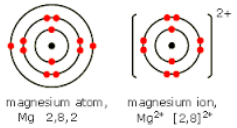
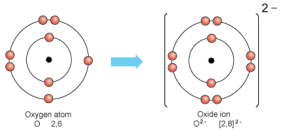
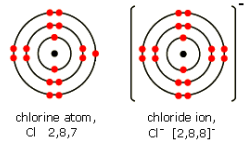
SMITH'S WOOD ACADEMY

1. Formation of ions based on the periodic table

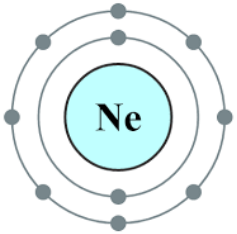
Ions – are charged particles formed from the gaining or losing of outer electrons.

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)



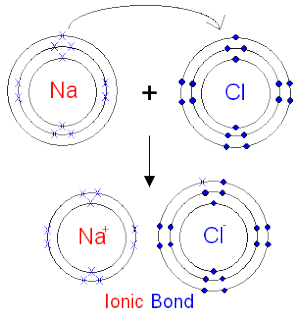
2. Ionic Bond

Metal – donates outer electrons

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

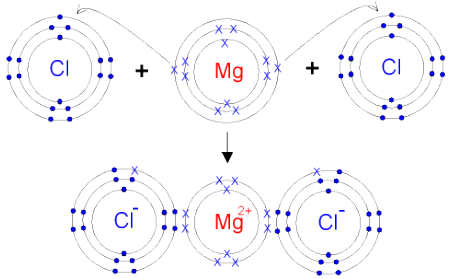
When a metal atom reacts with a non-metal atom electrons in the outer shell of the metal atom are **transferred.**

Making sodium chloride



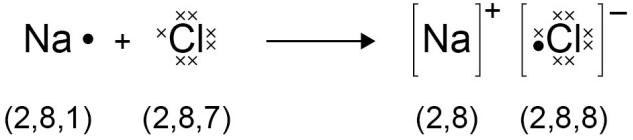
Formula - NaCl

Making magnesium chloride



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

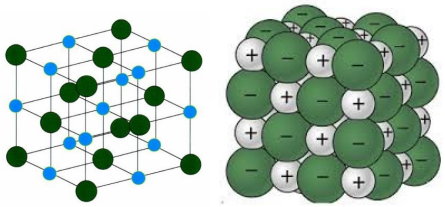
The electron transfer can be represented by simple dot and cross diagrams.



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)

Year 10 — Bonding and Structure

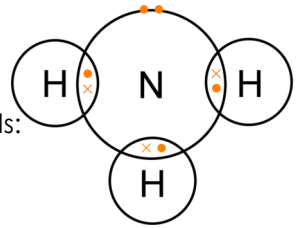
SMITH'S WOOD ACADEMY

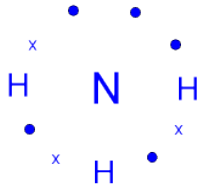
4. Covalent Bonding

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

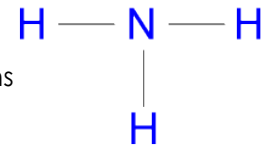
Outer electrons, with electron shells:



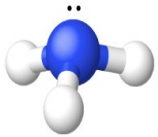


Dot and cross – outer electrons only

Bond lines – to show a pair of shared electrons

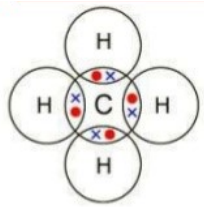


Or as a stick and ball model:

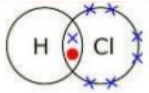


5a. Simple Covalent compounds

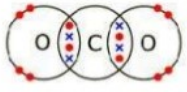
These are the structures of the common simple covalent compounds.



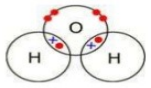
Methane CH_4



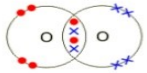
Hydrogen Chloride HCl



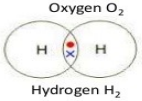
Carbon Dioxide CO_2



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.

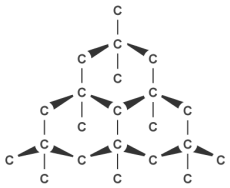
Non-conductive - Substances with a simple molecular structure do not conduct electricity. This is because they **do not** have any free electrons or an overall electric charge (ions).

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



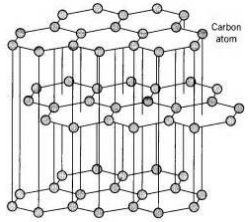
Properties

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

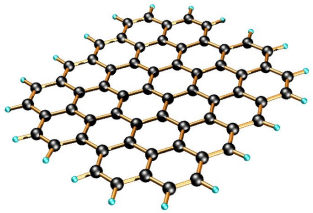
High melting and boiling point – all carbons have 3 strong covalent bonds which required extremely high temperatures to break.

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

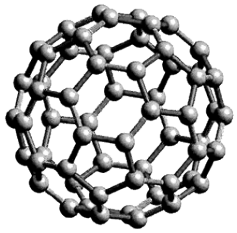


Graphene fibres are strong.
Graphene is highly resistant to attack by strong acids or strong alkalis and so can be used to give surfaces an ultra-thin protective layer which is transparent

Year 10 — Bonding and Structure

SMITH'S WOOD ACADEMY

7b. Buckminster Fullerene



It is actually not a giant covalent structure, but a giant molecule in which the carbon atoms form pentagons and hexagons - in a similar way to a leather football. It is used in lubricants

8. Exam questions on bonding:

By reference to the detailed structure of sodium chloride explain fully why:

(i) sodium chloride has a quite high melting point **(1)**

(ii) solid sodium chloride melts when it is heated strongly, **(2)**

(iii) molten sodium chloride will conduct electricity **(1)**

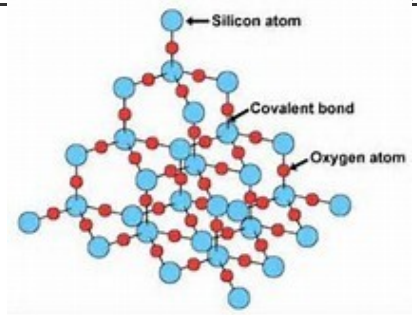
Use your knowledge of structure and bonding to explain why:

(i) graphite is very soft **(2)**

(ii) diamond is very hard **(2)**

(iii) graphite conducts electricity. **(2)**

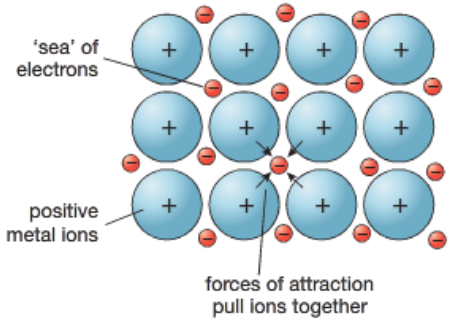
9. Silicon dioxide (comparison to diamond)



Silica, which is found in sand, has a similar structure to diamond. It is also hard and has a high melting point, but contains silicon and oxygen atoms, instead of carbon atoms. The fact that is a **SEMI-CONDUCTOR** makes it useful in the electronic industry.

10. Metallic bonding

Metals have giant structures of atoms with strong metallic bonding. The giant structure of metal cations with a 'sea of electrons' moving.

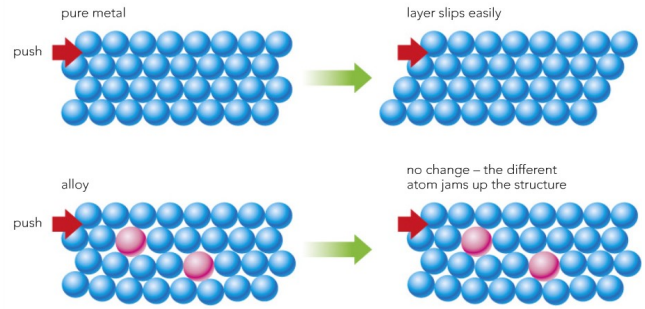


Metals conduct electricity as the electrical current is the movement of the delocalised electrons through the lattice of ions.

11. Alloys

An alloy is a mixture of fused metals.

Comparing the properties of metals and alloys



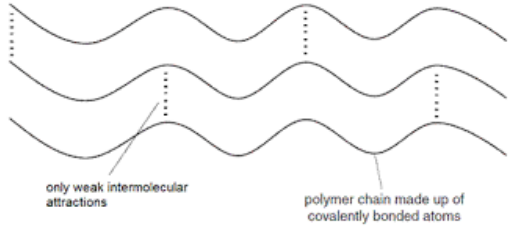
In a pure metal the atoms are in layers which can easily slide over each other. This means metals can be shaped and bent. They are **malleable** (can be hammered into shape) and are **ductile** (drawn into wires).

In an alloy, the **different sized** metal atoms **distort** the layers making it difficult to slide over each other. Alloys are **harder** than pure metals.

12. Polymer structure

Polymers are large molecules. They are formed from repeating units called monomers. They have strong covalent bonds between the atoms in the chain.

Between the polymers weak **intermolecular forces** keep the molecules together. These forces can be broken so polymer chains move over each other. This allows the polymer to be stretched.



As many of these intermolecular forces exist the substance are **solid** at room temperature.

The weaker the intermolecular forces the lower the melting point.

Types of polymer (HT only)

Addition polymerisation

- Monomers are identical
- Monomers have at least one carbon – carbon double bond
- Examples poly(ethene), PVC, PTFE

Weekly Biology Revision Plan 2020

Year 10

As a minimum you should be spending 30-45 minutes on Biology revision per week. The tasks listed below could take more than this if you do all of them so you will need to plan your time effectively. Regular revision is the key to success at GCSE, don't do too much in one go! We recommend approaching this revision as follows:

Primrose Kitten: Combined Science Biology Paper 1 https://www.youtube.com/watch?v=mKYQ-K23Mr4

GCSE AQA Combined Science TRILOGY https://www.bbc.co.uk/bitesize/examspecs/z8r997h

1. 10-15mins Read, cover and try to remember the information from You Tube and BBC Bitesize
2. 10-15mins creating your own revision resource to add to your folder (DO NOT COPY…TRANSFORM the information you have just read into something visual that you can remember)
3. 10-15mins Practicing application of what you have just revised, try exam questions and mark them using the mark schemes so you can correct your mistakes immediately!

Week beginning	Paper	Topic	Review (Read, cover, remember)	Revise and add to your revision folder	Teacher signed
6th Apr	PAPER 1	Cell Biology	Cell structure Investigating cells	Create a set of flash cards for each cell and microscope type	
6th Apr			Cell Division	Create a mind map linking chromosomes, mitosis, stem cells and their uses	
6th Apr			Transport in and out of cells	Create a comparison table for diffusion, osmosis and active transport	
13th Apr		Organisation	Levels of organisation	Create a pneumonic to remember the order of the levels of organisation	
13th Apr			Digestion	Draw an outline of the digestive system and label on what happens at each part (including which enzymes work at each part AND what they break down)	
13th Mar			Blood and circulation	Make 3 posters to put up in your room - The make up of blood and the differences between the 3 different blood vessels - The heart and the direction of blood flow through it - Gas exchange in the lungs	
20th Apr			Non-communicable diseases	Create flash cards for the different types of disease and their risk factors	
20th Apr			Transport in plants	Draw a plant and a cross section of a leaf and label on the different types of transport. Include information of factors which may affect the speed of the transport.	
20th Apr		Infection and response	Pathogens and disease	Create a table of diseases including information on pathogen, causes, symptoms and treatment.	
27th Apr			Human defences against disease	Create a mind map of all the ways your body defends against	

			Treating diseases	pathogens and then link this to boosting immunity with vaccines and the different ways we can treat diseases.	
27th Apr		Bioenergetics	Photosynthesis	Draw out the 3 rate of photosynthesis graphs and write a sentence to explain what is happening in each one.	
27th Apr			Respiration and exercise	Make flashcards for each of the key subtitles on this page, be sure to include the 3 equations you need to learn.	

Weekly Physics Revision Plan 2020

Year 10

As a minimum you should be spending 30-45 minutes on Physics revision per week. The tasks listed below could take more than this if you do all of them so you will need to plan your time effectively. Regular revision is the key to success at GCSE, don't do too much in one go! We recommend approaching this revision as follows:

Primrose Kitten: Combined Science Physics Paper 1 https://www.youtube.com/watch?v=xtw-Z0nllA4

GCSE AQA Combined Science TRILOGY https://www.bbc.co.uk/bitesize/topics/zqw77p3

1. 10-15mins Read, cover and try to remember the information in the revision guide
2. 10-15mins creating your own revision resource to add to your folder (DO NOT COPY…TRANSFORM the information you have just read into something visual that can help you to remember)
3. 10-15mins Practicing application of what you have just revised, try exam questions and mark them using the mark schemes so you can correct your mistakes immediately!

Week beginning	Paper	Topic	Review (Read, cover, remember)	Revise and add to your revision folder	Teacher signed
6th Apr	PAPER 1	Energy	Energy Stores and Transfers	Create a glossary of the key words in RED on this double page spread. Create flash cards containing the rearrangement triangles for the two energy equations you need to learn here.	
6th Apr			Energy transfers and resources	Create sample flow diagrams for 3 or 4 different energy changes e.g. a car accelerating, a skateboarder at the top of a ramp, boiling water in a kettle. Make flashcards for all the different types of energy resources, include whether they are renewable or not and their advantages and disadvantages.	
6th Apr		Electricity	Introduction to electricity	Create a poster of all the different components, their symbols and what they are used for. Include the charge equation, power equation, efficiency equation and energy transferred equation. Try and put the equations into the rearrangement triangles.	
13th Apr			Circuits and resistance	Draw the 3 current/voltage graphs for resistors, filament lamps and diodes and annotate around them to describe what is happening.	
13th Apr			Circuits and power	Draw a comparison table for series and parallel circuits. Include diagrams, information on current, resistance and potential difference.	
13th Apr			Domestic uses of electricity	Draw and label/annotate diagrams for D.C, A.C (give examples of appliances that use both current types) and Wiring a three pin plug (explain what each part does).	
20th Apr			Electrical energy in devices	Draw a flow chart to show how electricity gets from the power stations into our homes. Create a flash card with the advantages and disadvantages of overhead and underground cables.	
20th Apr		Particle Model of Matter	Particle model of matter	Draw the particle model for solids, liquids and gasses and annotate the diagrams to include information on their properties. Draw a labelled diagram of the density practical and annotate with summarised method type bullet points.	
20th Apr		Atomic Structure	Atoms and isotopes	Create a timeline for the development of the model of the atom. Include diagrams of previous models as well as the current accepted model and include the diagrams of the experiments that helped prove this new model.	
27th Apr			Nuclear radiation	Create flash cards for each type of radiation to include their components (diagrams), hazards and what they may be absorbed by.	

				Create a glossary of key terms for the key words in RED and summarise radioactive contamination into a short paragraph.	
27th Apr			Half life	Draw the count rate graph for iodine-128 and explain what its half life is and how you calculate it using the graph. Create a flash card for nuclear equations and then…PRACTICE, PRACTICE, PRACTICE!!	

‘Seneca Learning’ Sign-Up Guide

Passcode: j5v9tvzq48

Step 1: Open an internet browser - *Any browser except Internet Explorer will work.*

Step 2: Go to SenecaLearning.com

Step 3: Click on “Get Started” or “Sign Up”

Step 4: Create your account - *If you don’t know your parent email, then type: N/A.*

Step 5: Click on “Classes & Assignments” - *You’ll find this in the top menu.*

Step 6: Click on “Join Class” - *It’s the green button in the top right corner.*

Step 7: Type the code from your teacher - *If you received a link instead, then open the link.*