



Longley Park

SIXTH FORM ACADEMY

Creating Excellence Together,
through a culture of care

Get Ready For...

LONGLEY PARK SIXTH FORM

CHEMISTRY

What will I study?

- ❖ Chemistry allows you to learn more about the structure of the world around you by developing your understanding of scientific theory, and through practical investigations.
- ❖ On this course, you will learn about the chemicals and chemical reactions that we encounter every day, whether it is the reactions involved when breathing, baking or driving a car!
- ❖ You will also develop various practical skills, including the techniques involved in the synthesis, purification and analysis of organic substances.
- ❖ The topics you will study on the A-Level course build on those covered at GCSE, including atomic structure, bonding and the periodic table.
- ❖ Other key topics studied include chemical kinetics, equilibrium and molar calculations.
- ❖ You will also study some brand new topics, such as transition metal chemistry, entropy and modern analytical techniques.

What can I do next?

- ❖ Chemistry is a multi-disciplinary subject, where you will develop a variety of skills that are relevant for employment or study at a higher level. This includes problem solving, numeracy and practical skills.
- ❖ Chemistry is essential if you want to study subjects such as medicine, dentistry, pharmacy, forensic science or veterinary science at a higher level.
- ❖ Other popular choices for progression include chemistry, chemical engineering and biochemistry.
- ❖ Chemistry is often a desired choice for entrance to many other science-based courses and occupations, due to the skills you build on the course.

What additional opportunities will I have on my course?

- ❖ Visits to local university labs
- ❖ A variety of speakers from local scientific organisations, and ex-students
- ❖ The RSC Summer Exhibition
- ❖ The Cambridge University Challenge

Transition Tasks

This section contains a series of activities to help support you with the transition from GCSE Science to A-Level Chemistry. The activities cover some of the key topics that will be built on during the 1st year of the course. Try to attempt all activities to the best of your ability and **bring this work with you to your first lesson**. Completing the booklet will help us to identify any areas where you may need additional support.

Skill 1: Bonding types

Most chemicals form giant ionic, simple covalent, giant covalent or giant metallic structures. The type of bonding determines a chemical's structure, stability and many chemical and physical properties i.e. reactivity, melting point, conductivity etc.



Task 1: Research chemical bonding types, and complete the table below:

Bonding type	Ionic	Covalent		Metallic
Size	<i>Giant</i>	<i>Simple</i>	<i>Giant</i>	<i>Giant</i>
Examples				
Labelled diagram of the structure				
Types of particles present	<i>Negatively charged non-metal ions (anions) and positively charged metal ions (cations)</i>			
High or Low melting point?				
Conducts electricity?	When solid:			When solid:
	When aqueous/molten:			When aqueous/molten:

Skill 2: Writing chemical formulae

Chemists use formulae to represent the composition of elements, ions, compounds and molecules. It is important that you correctly work out the formula of chemicals, so that you can write balanced chemical equations, which are used throughout the A-Level Chemistry course. The chemical formula indicates the **number of atoms of each element** present.

- **Example 1:** Copper Sulfate has the chemical formula **CuSO₄**
This means there are: 1 Copper atom, 1 Sulfur atom and 4 Oxygen atoms

When the chemical formula contains brackets, all of the **components inside the brackets are multiplied** by the number outside the brackets.

- **Example 2:** Magnesium Nitrate has the chemical formula **Mg(NO₃)₂**
This means there are: 1 Magnesium atom, 2 Nitrogen atoms and 6 Oxygen atoms

Task 2: How many atoms of each element are present?

Formula	CaCO ₃	Cu(OH) ₂	Ca(HCO ₃) ₂	(NH ₄) ₂ SO ₄
Composition				

Ionic compounds are made up of a positively-charged metal ion (**cation**) and a negatively-charged non-metal ion (**anion**). In the overall compound, the charges on these ions must balance and cancel out so the overall charge is zero *e.g.* Sodium Chloride (table salt) has the chemical formula NaCl; the cation is Na⁺ and the anion is Cl⁻. Before you can work out the formulae of ionic compounds, you need to be able to work out the charges on ions. The charges on ions formed from elements depend on

Group	1	2	3	4	5	6	7
Ion Charge	1+	2+	3+	4+ OR 4-	3-	2-	1-

- **Example :** Magnesium (Mg) is found in group 2 so would form a Mg²⁺ ion
Fluorine (F) is found in group 7 so would form a F⁻ ion
2 F⁻ ions are needed to cancel out the 2 positive charges on the magnesium ion
So the formula for magnesium fluoride is MgF₂.

Task 3: What is the formula of these ionic compounds?

Name	Sodium Oxide	Aluminium Chloride	Lithium Nitride	Calcium Phosphide
Formula				

Transition metal elements (those in the centre block of the periodic table!) can form ions with different ionic charges. In these cases we always label the charge on the metal ion using **roman numerals**.

- **Example 1:** Iron (III) chloride contains Fe^{3+} ions so the formula is FeCl_3
- **Example 2:** Lead (II) oxide contains Pb^{2+} ions so the formula is PbO

Task 4: What is the formula of these ionic compounds containing transition metals?

Name	Silver (I) Oxide	Titanium (II) Chloride	Lead(I) Nitride	Vanadium(V) Fluoride
Formula				

There are also more complicated ions, rather than those formed from atoms of elements; these are called **compound ions** (note that compound ions containing oxygen end in **-ate**, rather than -ide)

Name	Hydroxide	Nitrate	Carbonate	Sulfate	Phosphate	Ammonium
Formula	OH^-	NO_3^-	CO_3^{2-}	SO_4^{2-}	PO_4^{3-}	NH_4^+

- **Example 1:** Potassium Sulfate contains K^+ and SO_4^{2-} ions
So 2 x K^+ ions are needed to cancel out the 2 negative charges on the SO_4^{2-} ion.
Therefore the formula of potassium sulfate is K_2SO_4
- **Example 2:** Magnesium Nitrate contains Mg^{2+} and NO_3^- ions
So 2 x NO_3^- ions are needed to cancel out the 2 positive charges on the Mg^{2+} ion.
Therefore the formula of magnesium nitrate is $\text{Mg}(\text{NO}_3)_2$
(Please note, where there is more than one compound ion present, brackets are used in the formula)

Task 5: What is the formula of these ionic compounds containing compound ions?

Name	Lithium Hydroxide	Sodium Carbonate	Aluminium Nitrate	Ammonium Carbonate
Formula				

Covalently bonded molecules do not contain ions, so the same method cannot be used to work out the formula of covalent molecules. For now, make sure that you know the formula of these common chemicals:

Task 6: Research the formula of common chemicals

Name	Hydrochloric acid	Nitric acid	Sulfuric acid	Ammonia	Methane	Water
Formula						

You also need to be aware that some elements exist as **diatomic or polyatomic molecules**, rather than as individual elements. For example, atoms of **oxygen** will bond with each other to form O_2 molecules. **Hydrogen, Nitrogen, Fluorine, Chlorine, Bromine** are other examples of diatomic molecules. Some examples of polyatomic molecules are Phosphorus, which forms P_4 molecules, and Sulfur, which forms S_8 molecules.

Skill 3: Writing balanced symbol equations

Balanced equations are important, as they tell us the ratio of the reactants reacting in a chemical reaction. They can also be used to determine the amount of product that can be made in a chemical reaction. To create a balanced symbol equation, first you need to correctly write the formula of the reactants and products (using the skills we've just practiced!), and then you need to balance the number of atoms of each element on each side of the equation.

(TIP: Balance the metal atoms first, then non-metal atoms (except H and O), then balance H or O atoms)

➤ **Example:** Sodium sulfate forms from the reaction between sodium hydroxide and sulfuric acid
Start by writing the formulae: $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
Then balance the metal atoms: $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
Then balance the non-metal atoms: $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$



Task 7: Balance these equations

- a) $NaI + Cl_2 \rightarrow NaCl + I_2$
- b) $S_8 + O_2 \rightarrow SO_2$
- c) $HCl + K_2CO_3 \rightarrow KCl + H_2O + CO_2$
- d) $HNO_3 + Al_2O_3 \rightarrow Al(NO_3)_3 + H_2O$
- e) $NH_3 + O_2 \rightarrow NO_2 + H_2O$
- f) $PbO + C \rightarrow Pb + CO_2$



Task 8: Write the symbol equations for these reactions, then balance them

- a) sulfur dioxide + oxygen $\rightarrow$ sulfur trioxide
- b) magnesium + hydrochloric acid $\rightarrow$ magnesium chloride + hydrogen
- c) sodium hydroxide + sulfuric acid $\rightarrow$ sodium sulfate + water
- d) potassium oxide + sulfuric acid $\rightarrow$ potassium sulfate + water

How can I go the extra mile to prepare for my course?

Additional Reading/ Useful Websites:

- A selection of links to transition resources can be found at:
www.ocr.org.uk/blog/five-resources-to-support-students-moving-from-gcse-to-a-level-chemistry
- Two very helpful transition guides from CPG:
www.amazon.co.uk/Level-Chemistry-Essential-Maths-Skills/dp/1782944729
www.amazon.co.uk/Head-Start-level-Chemistry-Level/dp/1782942807
- Chemistry wider reading and research tasks
<https://uobschool.org.uk/wp-content/uploads/2020/06/Chemistry-Optional-Transition-Tasks-PDF.pdf>
- GCSE to A-Level bridging YouTube videos – Allery Chemistry
www.youtube.com/playlist?list=PLX4e2DxFRGQIUvLpjDK9FWTxZUVxP8dFi

What else can I do to prepare for starting Sixth Form? What our students say

“Get ready emotionally, it is different from school!”

“Be confident. Put yourself out of your comfort zone and meet new people; you will meet lots of new people when you get here”

“Start looking at Universities/ Careers now! It will give you a focus when you start at Sixth Form”

“You will need to be more independent and be able to manage your time differently to school. Start building those skills now!”



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Additional Opportunities

We offer a variety of different opportunities to enrich your time with us and support your next steps:

- ✓ A variety of Clubs and Societies through Project You
- ✓ Employer immersion visits & Trips to employers
- ✓ Work Experience & Placement
- ✓ Trips to Universities
- ✓ Guest Speakers
- ✓ Leadership through the Student Ambassador Programme
- ✓ Independent Learning Centre with IT, books and journals, quiet and group study + Seminar Rooms
- ✓ Health and Fitness Activities in our onsite gym
- ✓ Duke of Edinburgh
- ✓ Career Ready internship Programme
- ✓ Access to wellbeing, academic tutorial, and careers support