

# A-Level Chemistry

## Summer Induction Work

Name: \_\_\_\_\_

**One question I already have about A-Level Chemistry:**

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## Welcome to A-Level Chemistry

Chemistry helps explain how the world works: how batteries store energy, how medicines interact with the body, how fertilisers support food production, why materials behave as they do, and how scientists design solutions to global problems.

This booklet is deliberately short. It is designed to refresh some essential GCSE ideas and get you thinking like a chemist before the course begins.

### **By the end of this booklet, you should have:**

- Checked your confidence with important GCSE knowledge.
- Made links between chemistry and real-world technologies.
- Practised explaining ideas in clear scientific language.
- Identified anything you may want to revise before September.

# Meet Your Chemistry Teachers

## Dr Fulford - Research expertise and university-level chemistry

Dr Fulford brings specialist academic and research experience to the Chemistry department. After completing a Phd, he worked with universities and researchers, applying chemistry beyond the classroom and contributing to scientific projects and investigations.

His experience gives students a valuable insight into how chemistry is studied and used in higher education, research and industry. He will help you understand the deeper scientific principles that underpin A-Level Chemistry and develop the analytical thinking that universities and employers value.

Dr Fulford is particularly interested in helping students move beyond simply learning facts and towards thinking like chemists: asking why reactions happen, how evidence supports conclusions, and how chemical ideas can be used to solve problems.

## Mr Vinters - Examination expertise and 25 years of classroom experience

Mr Vinters has over 25 years of experience teaching science and chemistry in secondary schools. During his career he has taught thousands of students, held leadership positions including Head of Chemistry and Head of Science, and worked with students across a wide range of abilities and settings.

As an experienced examiner, Mr Vinters has a detailed understanding of how examination questions are written, how marks are awarded and what high-quality answers look like. He will help you develop the knowledge, practical skills and exam technique needed to achieve your full potential.

His aim is to make chemistry clear, accessible and relevant, while also making sure students are confident with the precise language and problem-solving skills needed for A-Level success.

### The best of both worlds

Dr Fulford brings research experience, university links and specialist subject knowledge.

Mr Vinters brings classroom experience, curriculum knowledge and examination expertise.

Together, we aim to provide a course that is challenging, supportive, engaging and enjoyable.

**Whether you are interested in medicine, pharmacy, engineering, environmental science, research, teaching or simply understanding how the world works, we look forward to working with you over the next two years.**

## Activity 1: Why Study Chemistry?

Chemistry is often called the central science because it connects physics, biology, medicine, engineering and environmental science. The products and technologies below may seem very different, but they all rely on chemistry to function.

Look at the following technologies and products: lithium-ion batteries, medicines, fertilisers, sports drinks and airbags.

### Part A - First thoughts

Technology or product	What do you already know about it?
Lithium-ion batteries	
Medicines	
Fertilisers	
Sports drinks	
Airbags	

### Part B - Making connections

Which of these products helps store or release energy?

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Which of these products is designed to improve human health?

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Which of these products helps increase food production?

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Which of these products relies on carefully controlled chemical reactions?

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### Part C - The big question

What do all of these products have in common? Write a short paragraph of 50-100 words explaining how chemistry is involved in each of them.

*Try to include ideas such as atoms and molecules, chemical reactions, energy changes, materials and designing new products.*

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## Activity 2: GCSE Chemistry Non-Negotiables

Before starting A-Level Chemistry, you need to be confident with the core GCSE ideas below. You do not need to write long answers. Use this as a checklist.

**R = I need to revise this    A = I partly remember this    G = I am confident with this**

No.	GCSE Chemistry Non-Negotiable	R	A	G
1	I can describe the structure of an atom.			
2	I know the relative charges of protons, neutrons and electrons.			
3	I know the relative masses of protons, neutrons and electrons.			
4	I can work out numbers of protons, neutrons and electrons from atomic number, mass number and charge.			
5	I can explain what an isotope is.			
6	I can write electronic configurations for atoms and ions.			
7	I can explain ionic bonding.			
8	I can explain covalent bonding.			
9	I can explain metallic bonding.			
10	I can link structure and bonding to melting point and boiling point.			
11	I can explain why substances conduct electricity.			
12	I can calculate relative formula mass, Mr.			
13	I can calculate moles using mass divided by Mr.			
14	I can rearrange and use concentration = moles divided by volume.			
15	I can convert between cm <sup>3</sup> and dm <sup>3</sup> .			
16	I can balance chemical equations.			
17	I can write and use state symbols: (s), (l), (g), (aq).			
18	I can explain oxidation and reduction in terms of electrons.			
19	I can identify acids, alkalis and neutral solutions using pH.			
20	I can describe neutralisation reactions.			
21	I can explain what a salt is and how salts are made.			
22	I can describe the reactivity series and displacement reactions.			
23	I can explain electrolysis in terms of ion movement.			
24	I can describe exothermic and endothermic reactions.			
25	I can interpret simple practical results and identify sources of error.			

### Reflection

Which three areas do you most need to revise before September?

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Which area are you most confident with?

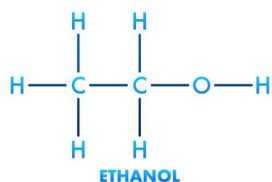
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Which area worries you most?

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## Activity 3: Chemistry Detective

A-Level Chemistry often involves looking at a structure and using evidence to make a sensible judgement. You do not need to know every molecule yet. The aim is to practise noticing patterns.



Which molecule(s) contains nitrogen?

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Which molecule(s) contains oxygen?

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Which molecule do you think would dissolve best in water?

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Explain your reasoning.

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## Activity 4: Think Like a Chemist

There is no single perfect answer here. The aim is to explain your thinking using scientific ideas.

**Why does a battery eventually go flat?**

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**Why does iron rust but gold does not?**

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**Why does ice float on water?**

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## Activity 5: A-Level Readiness Check

Choose the best answer. This is not a formal test. It is designed to help you identify anything you may want to revise.

<p><b>1 Which particle has a relative charge of +1?</b></p> <p><b>A</b> Proton</p> <p><b>B</b> Neutron</p> <p><b>C</b> Electron</p> <p><b>D</b> Atom</p>	<p><b>6 Which state symbol represents aqueous?</b></p> <p><b>A</b> (s)</p> <p><b>B</b> (l)</p> <p><b>C</b> (g)</p> <p><b>D</b> (aq)</p>
<p><b>2 What is the relative mass of an electron?</b></p> <p><b>A</b> 1</p> <p><b>B</b> 0</p> <p><b>C</b> Very small compared with a proton</p> <p><b>D</b> 1836</p>	<p><b>7 Which particle is found in the nucleus?</b></p> <p><b>A</b> Electron</p> <p><b>B</b> Proton</p> <p><b>C</b> Photon</p> <p><b>D</b> Ion</p>
<p><b>3 Which type of bonding involves shared electrons?</b></p> <p><b>A</b> Ionic</p> <p><b>B</b> Metallic</p> <p><b>C</b> Covalent</p> <p><b>D</b> Hydrogen</p>	<p><b>8 Which substance contains ionic bonding?</b></p> <p><b>A</b> Methane</p> <p><b>B</b> Water</p> <p><b>C</b> Sodium chloride</p> <p><b>D</b> Oxygen</p>
<p><b>4 What is the formula for sulfuric acid?</b></p> <p><b>A</b> HCl</p> <p><b>B</b> HNO<sub>3</sub></p> <p><b>C</b> H<sub>2</sub>SO<sub>4</sub></p> <p><b>D</b> NaOH</p>	<p><b>9 What happens during oxidation?</b></p> <p><b>A</b> Gain of electrons</p> <p><b>B</b> Loss of electrons</p> <p><b>C</b> Gain of neutrons</p> <p><b>D</b> Loss of protons</p>
<p><b>5 Which equation links mass, moles and Mr?</b></p> <p><b>A</b> moles = mass × Mr</p> <p><b>B</b> moles = mass ÷ Mr</p> <p><b>C</b> mass = Mr ÷ moles</p> <p><b>D</b> Mr = mass × moles</p>	<p><b>10 Which statement best describes a catalyst?</b></p> <p><b>A</b> It increases yield</p> <p><b>B</b> It increases concentration</p> <p><b>C</b> It speeds up a reaction without being used up</p> <p><b>D</b> It raises temperature</p>



## Activity 6: Watch and read something amazing

Watch one chemistry video from Periodic Videos, the Royal Institution or NileRed. Choose something that genuinely interests you.

**Tell us one interesting thing you learned.**

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**Write one question the video made you think of.**

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## Final thought

In your first Chemistry lesson, you will see demonstrations that involve extracting metals and generating electricity. Everything you study over the next two years is hidden somewhere inside those demonstrations.

**Welcome to A-Level Chemistry. We look forward to meeting you in September.**