



## CHEMISTRY

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#### **Why is the study of chemistry important?**

Chemistry is the branch of science which endeavours to explore and gain understanding of the composition, behaviour and properties of matter, and of the elements of the Earth and its atmosphere. Of the three sciences chemistry is the one that underpins the conceptual framework and methodology of biochemistry, molecular medicine and is at the heart of many if not all scientific understanding. It is hard to imagine any product of modern times which has not required the efforts of a chemist at some point in its development. The lines between the three sciences can cross and chemistry is the subject which forms the bridge between the three.

The key focus of chemistry is achieving an understanding of the basic principles with the ultimate goal of developing a greater understanding of the how and the why. In developing an understanding of this phenomena chemistry has led to the discovery and production of materials, structures, processes and devices some of which can have productive ends, or some that can be catastrophically destructive. Chemistry's contribution to our modern world is immense. It has changed how we use medicines, materials, fuels and chemicals to form the backbone of industry, commerce and life itself.

Chemistry will be taught in a way to develop curiosity about the natural and modern world. Our curriculum develops insight into how science works and a full appreciation of its relevance to our everyday lives. The scope and nature of studying chemistry will be broad, practical and relevant. It is our vision to encourage students to be inspired, motivated and challenged by science and its contribution to society.

Across your study you will explore *atomic structure, quantitative structure, organic chemistry, chemical analysis, rate of chemical change and chemistry and the atmosphere*. You will develop an appreciation of how these topics are essentially interlinked. Lessons will provide a wide range of opportunities for practical experiments, demonstrations and modelling of complex theories that surround us in our everyday lives. Your Science classroom will be brimming with practical experiments where you will learn to formulate hypotheses, analyse data and write conclusions. You will engage with ideas such as the scientific process and how throughout history this process has led to some of the greatest scientific discoveries. Seems challenging? You are going to love it! Chemistry will explode your mind!

#### **Big Questions**

*How do elements join together? What can this tell us about elementary particles? How can understanding the structure of an atom lead to a further understanding of why a chemical reacts the way it does? How can we link this to the environment and the future of our planet? How can an understanding of atomic structure can lead to some of the most advanced medical techniques whilst at the same time lead to catastrophic contamination and hazards?*

### **What skills will the study of chemistry teach you?**

You are a citizen in this world and you need to know how the natural and modern world works. It will teach you to...

- Understand theories that explain phenomena
- Apply basic ideas and models that support understanding
- Evaluate models and theories
- Present theories in mathematical form
- Recall quantitative relationships
- Derive quantitative relationships between various measured quantities
- Explain how theories are borne out by experiment
- Apply experimental procedure and understand that it is a measure of success of a theory
- Present, interpret and evaluate experimental data
- Apply mathematical skills to solve problems
- Develop a deeper understanding of everyday experiences including the natural world and modern devices.

### **What will you know and understand from your study of chemistry?**

- Develop scientific knowledge and conceptual understanding of chemistry
- Develop understanding of the nature, processes and methods of how the elements interact
- Develop and learn to apply observational, practical, modelling, enquiry and problem-solving skills, both in the laboratory, in the field and in other learning environments
- Develop their ability to evaluate claims based on scientific discoveries through critical analysis of the methodology evidence and conclusions, both qualitatively and quantitatively.

### **How does your study of chemistry support your study in other subjects?**

Study of any subject in our curriculum takes full advantage of links with other subject areas- we term these as interdisciplinary links and we make the most of them because we know that deep learning requires the transference of knowledge and skills from one topic of learning to another. Once you can transfer your learning across topics and subject areas then you are really mastering what you know and how to apply your understanding and skills.

Chemistry touches on so many other subjects such as mathematics, *applied mathematics*, *chemistry*, *biology*, *music*, *construction and design*. You will learn methods of thinking and research that are widely applicable to other subject areas helping your thinking in all subjects. As a science chemistry relies heavily upon evidence to test predictions and theories. Through developing mathematical techniques as well as applying reasoning your skills to present and justify information can be applied to most careers and further education.

Across the teaching of subjects, teachers will make reference to your learning in other areas such as mathematics, biology and physics and this will help you to develop your understanding. There are even opportunities to apply this learning in years 7, 8 and 9 when interdisciplinary study days are organised to deepen your understanding across the curriculum such as when our STEM departments work together to solve a common problem.

### **How can you deepen your understanding of chemistry?**

Our Science department offers lots of great opportunities for you to engage with this fabulous subject. Why not look out for the large range of enrichment clubs on offer. We offer STEM events and activities that may include opportunities to visit local colleges and universities and visitors to the academy offering extra enrichments. There may be visits to science museums and events that celebrate great scientists and discoveries. We offer after school support sessions for GCSE students and work with other departments to enhance learning such as maths in science. Get involved!

### **How are you assessed in chemistry?**

Throughout the 5 year science study, you are assessed in chemistry using the following assessment objectives which ensure that you can cumulatively build your subject understanding in preparation for future GCSE and A Level study. There are half termly assessment points each year that we term Praising Stars. For years 7, 8 and 9 we base our assessment on our subject mapping of the age-related expectations across the curriculum, assessing students' performance at their current stage of study against expectation. At GCSE we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE targets. These are also the basis for any appropriate support and intervention.

#### **Key Assessment Objectives**

AO1: Demonstrate knowledge and understanding of:

- Scientific ideas
- Scientific techniques
- Scientific procedures

AO2: Apply knowledge and understanding of:

- Scientific ideas
- Scientific enquiry
- Scientific techniques and procedures

AO3: Analyse information and ideas to:

- Interpret and evaluate
- Make judgements and draw conclusions

- Develop and improve experimental procedures.

### **How can chemistry support your future?**

Of course we offer the study of GCSE and we encourage your continued study in this fantastic subject. Yet we know that choice and personal interest are important aspects of worthy study. Whether you have continued your study of chemistry into GCSE or A level or not you will have gained access to this enriching subject and its study will have taught you to think differently and deeply.

Chemistry is offered at most prestigious universities either as a single honours or a joint honours subject studied alongside other disciplines e.g. chemical engineering, veterinary sciences and medicine. The very fact that you have been able to study chemistry strengthens your analytical thinking and mathematical reasoning that will help your future application be they for colleges, universities, apprenticeships or employment.

Careers that the study of chemistry supports include:

- Teaching
- Medicine
- Veterinary Science
- Chemical Engineering
- Forensic Science
- Biochemistry
- Pharmacy

**SCIENCE CURRICULUM PROGRESSION PATHWAY AT OUTWOOD ACADEMY Bydales 24/25**

	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>
<b>Autumn 1</b>	Unit 1 - Introduction to Science Unit 2 - Matter and Energy	Unit 6 - Plants, Ecology and Climate Change Unit 7 – Forces	Unit 11 - Electricity and Magnetism Unit 12 - Patterns and Materials Unit 13 - Health End of KS3 Assessments and Consolidation	P1- Energy P2- Electricity C2 - Bonding and Structure C3 - Quantitative Chemistry B2 - Organisation	P5 - Forces B5 - Homeostasis and Response B6 - Inheritance C6 - Rates of Reaction C7 - Organic Chemistry
<b>Autumn 2</b>	Unit 2 - Matter and Energy Unit 3 - Chemical Substances	Unit 7 – Forces Unit 8 - Chemical Reactions	C1 - Atomic Structure B1 - Cell Biology	B2 - Organisation C3 - Quantitative Chemistry C4 - Chemical Changes P3 - Particle Model B3 - Infection and Response (F)	P6 - Waves B6 - Inheritance C8 - Chemical Analysis C9 - Chemistry of the Atmosphere (Excluding Triple) P7 - Magnetism and Electromagnetism (F)
<b>Spring 1</b>	Unit 3 - Chemical Substances Unit 4 - Animal Organ Systems	Unit 8 - Chemical Reactions Unit 9 - Cells, Evolution and Inheritance	B1 - Cell Biology	B3 - Infection and Response C4 - Chemical Changes P4 - Atoms and Radiation B4 - Bioenergetics (F)	P7 - Magnetism and Electromagnetism B7 - Ecology C10 - Using Resources
<b>Spring 2</b>	Unit 4 - Animal Organ Systems Unit 5 - Space, Earth and Sustainability	Unit 9 - Cells, Evolution and Inheritance Unit 10 - Waves	P1 - Energy C2 - Bonding and Structure	B4 - Bioenergetics B5 - Homeostasis and Response C5 - Energy Changes P5 - Forces (F) C6 - Rates of Reaction (F)	P8 - Space (Triple Science) Paper 2 Consolidation
<b>Summer 1</b>	Unit 5 - Space, Earth and Sustainability Unit 6 - Plants, Ecology and Climate Change	Unit 10 - Waves Unit 11 - Electricity and Magnetism	C2 - Bonding and Structure B2 - Organisation	B5 - Homeostasis and Response C6 - Rates of Reaction P5 - Forces Paper 1 Consolidation	Masterclasses, Revision and Exams
<b>Summer 2</b>	Unit 6 - Plants, Ecology and Climate Change	Unit 11 - Electricity and Magnetism Unit 12 - Patterns and Materials	B2 - Organisation P2 - Electricity	Paper 1 Consolidation and Revision P5 - Forces C7 - Organic Chemistry (F)	Exams

## SCIENCE CURRICULUM PROGRESSION PATHWAY AT OUTWOOD ACADEMY Bydales 25/26

	Year 7	Year 8	Year 9	Year 10	Year 11
<b>Autumn 1</b>	Unit 1 - Introduction to Science Unit 2 - Matter and Energy	Unit 7 – Forces	Unit 13 Health End of KS3 Assessments and Consolidation	B3 - Infection and Response P2 - Electricity	B6 - Inheritance C6 - Rates of Reaction P6 - Waves
<b>Autumn 2</b>	Unit 2 - Matter and Energy Unit 3 - Chemical Substances	Unit 7 – Forces Unit 8 - Chemical Reactions	C1 - Atomic Structure B1 - Cell Biology	P3 - Particle Model of Matter C3 - Quantitative Chemistry	B7 - Ecology C7 - Organic Chemistry P7 - Magnetism and Electromagnetism
<b>Spring 1</b>	Unit 3 - Chemical Substances Unit 4 - Animal Organ Systems	Unit 8 - Chemical Reactions Unit 9 - Cells, Evolution and Inheritance	B1 - Cell Biology P1 - Energy	B4 - Bioenergetics P4 - Atomic Structure and Radiation	B7 - Ecology C8 - Chemical Analysis C9 - Chemistry of the Atmosphere P8 - Space (Triple Science Only)
<b>Spring 2</b>	Unit 4 - Animal Organ Systems Unit 5 - Space, Earth and Sustainability	Unit 9 - Cells, Evolution and Inheritance Unit 10 - Waves	P1 - Energy C2 - Bonding and Structure	C4 - Chemical Changes C5 - Energy Changes	C10 - Using resources Masterclasses and Revision
<b>Summer 1</b>	Unit 5 - Space, Earth and Sustainability Unit 6 - Plants, Ecology and Climate Change	Unit 10 - Waves Unit 11 - Electricity and Magnetism	B2 - Organisation	P5 - Forces B5 - Homeostasis and Response Paper 1 Consolidation	Masterclasses, Revision and Exams
<b>Summer 2</b>	Unit 6 - Plants, Ecology and Climate Change	Unit 12 - Patterns and Materials	B2 - Organisation P2 - Electricity	C6 - Rates of Reaction B5 - Homeostasis and Response P5 - Forces End of Year Exams	Exams