



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 hypothesize, 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 Y7 and 8 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 really engage with this fabulous subject. Why not look out for the large range of enrichment clubs on offer, with a different theme each term for Years 7, 8 and 9. We offer STEM events and activities that may include opportunities to visit local colleges and universities and visitors to the academy offering extra enrichments such as Robotics. 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 and geography in science. Get involved!

How are you assessed in Chemistry?

Throughout the 5 year study of Chemistry (3 years at KS3 and 2 years at GCSE) 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 in years 10 and 11 we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE targets.

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 A Level Chemistry at academies with post 16 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 REDCAR

| | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 |
|-----------------|---|---|---|---|--|
| Autumn 1 | Unit 1 Introduction to Science - bridging the gap between KS2 and KS3 and looking at core science skills. Unit 2 - Matter and Energy | Unit 1 - Practical and Investigation skills. Unit 2 - Matter and energy. | Space. The Skeletal System. Rocks. | Waves. Particle Model of Matter. | Masterclasses for;- C2 Bonding, C3 Quantitative Chemistry C4 Chemical Changes P1 Energy P2 Electricity |
| Autumn 2 | Unit 2 - Matter and Energy. Unit 3 - Chemical substances. | Unit 2 - Matter and energy. Unit 3 - Organ systems. | Light and Sound Waves. Living Organisms. | Cell Biology. Bonding, Structure and the properties of matter. | Masterclasses for;- C1 Atomic Structure B4 Bioenergetics P3 Particle Model of Matter P4 Atomic Structure Gap Analysis |
| Spring 1 | Unit 3 - Chemical substances. Unit 4 - Animal Organ systems. | Unit 3 - Organ systems. Unit 4 - Chemical reactions. | Chemical Patterns. | Organisation and cell transport. Energy. | C6 Rates of Reaction C7 Organic Chemistry C8 Chemical Analysis C9 Chemistry of the Atmosphere P8 Space - Triple Only Biology and Physics Paper 2 Masterclasses |

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| Spring 2 | Unit 4 - Animal organ systems. Unit 5 - Space, Earth and Sustainability. | Unit 4 - Chemical reactions. Unit 5 - Forces and electricity. | Energy and Electricity. | Homeostasis and Response. Quantitative Chemistry. Electricity. Chemical changes. | Masterclasses for:- B7 Ecology C10 Using Resources . P6 Waves . Teaching based on GAP analysis from March assessment. |
| Summer 1 | Unit 5 - Space, Earth and Sustainability. Unit 6 - Plants, Ecology and Climate change. | Unit 5 - Forces and electricity. Unit 6 - Plants and ecosystems. | Healthy Living. | Electricity. Chemical changes. | Paper 1 Bespoke Masterclasses and Exam Briefings |
| Summer 2 | Unit 6 - Plants, ecology and climate change. | Unit 6 - Plants and ecosystems. | Forces. The Environment. | Ecology. Atomic Structure. | - |