Thomas Mills
High School & Sixth Form

CURRICULUM OVERVIEW: Chemistry

KS4 Chemistry Curriculum Intent Statement (Year 9)
At Thomas Mills High School, Year 9 marks the beginning of our Key Stage 4 Chemistry curriculum. It is designed to provide all pupils with a secure foundation in the core principles of GCSE Chemistry, enabling them to understand the substances, structures, and reactions that underpin both natural processes and technological developments. The curriculum is structured to ensure pupils gain a deep understanding of scientific concepts and develop the skills necessary to become curious, confident, and capable scientists.
Our intent is to:
Develop Scientific Knowledge and Understanding:
We aim to ensure that pupils build a strong understanding of key chemical concepts, including the particle model, atomic structure, separation techniques, bonding, and the periodic table. Pupils begin their GCSE journey by exploring the historical and modern models of the atom, analysing physical and chemical separation methods, and learning about ionic, covalent, and metallic bonding. These topics lay the groundwork for deeper study later in KS4 and are taught in a coherent sequence to maximise long-term understanding.
Curiosity, Inquiry and Skills Development:
Through practical work, demonstrations, and investigative tasks, we encourage pupils to explore and question the chemical world. Pupils develop safe and effective laboratory skills, carry out required practicals including flame tests, chromatography, and displacement reactions, and analyse evidence from chromatograms, mass spectra, and infrared spectroscopy. They also build fluency in key calculations such as formulae, isotopic masses, and surface area to volume ratios, while enquiry-based learning helps them link structure and bonding to the behaviour of materials.
Prepare for Future Learning:
We ensure that pupils are well-prepared for further GCSE Chemistry study in Years 10 and 11. By introducing analytical techniques, nanotechnology, and environmental chemistry, we help pupils appreciate the relevance of Chemistry to modern life and potential careers in science, medicine, and engineering. This early start to KS4 allows pupils to develop confidence and secure the foundational knowledge needed for success in examinations and lifelong engagement with the subject.

Year 9			
Term	**Topic**	**Knowledge and Skills**	**Useful Links**
1			Solids, liquids and gases - Particle model - OCR Gateway -

	Name of topic/Topics **9C1 – Particles**	**Knowledge:** The Key Stage 4 Particles topic introduces pupils to the fundamental principles of the particle model and the development of atomic theory. Pupils learn to describe the properties and behaviour of solids, liquids and gases, and to explain changes of state using particle theory. They study heating and cooling curves to understand energy transfer during physical changes, and begin to evaluate the limitations of particle models. The unit also traces the historical development of atomic theory, from Democritus through to Bohr, leading to the modern understanding of atoms, subatomic particles, isotopes, and ions. These ideas form the foundation for later topics in chemical bonding, reactions, and analysis. **Skills:** Through practical demonstrations and conceptual modelling, pupils develop their ability to explain physical changes using the particle model and to interpret heating and cooling graphs. They strengthen their skills in analysing scientific ideas and data, including the calculation of charge on particles and understanding atomic structure. Pupils engage in discussions about the evolution of scientific ideas, using key examples from the history of atomic theory to support their reasoning. The topic supports the development of evaluative and analytical skills, encouraging pupils to link theoretical knowledge with observable phenomena in the physical world.	GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize What are changes of state? GCSE Chemistry - OCR Gateway - BBC Bitesize Developing models of atoms - Atomic structure - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Particles - Multiple choice questions - Sample exam questions - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Unit: States of matter | KS4 Chemistry | Oak National Academy Unit: Atomic structure and the periodic table | KS4 Chemistry | Oak National Academy
Assessments	A mid-unit low-stakes test and a more formal end-of-unit test completed under exam conditions. These assessments are designed to check understanding of key concepts and identify areas for improvement. Pupils		

		receive feedback on both assessments, with time allocated in class to review answers and address misconceptions. Topic Summary Checklists are used throughout the unit to help pupils monitor their own progress and reflect on their understanding of the content.	
2	**Name of topic/Topics** **9C2 – Elements, Compounds and Mixtures.**	**Knowledge:** The Key Stage 4 Elements, Compounds and Mixtures topic deepens pupils' understanding of chemical substances and their structure. Pupils learn the difference between pure substances and mixtures, both in everyday and scientific terms, and investigate how melting points can be used to determine purity. They explore a range of separation techniques including filtration, distillation, crystallisation, and chromatography, and learn how these methods are used to obtain pure substances from mixtures. The topic introduces key ideas in atomic structure and bonding, covering electron configuration, the periodic table, and the formation of ions. Pupils also examine how atoms bond in different ways—ionic, covalent, and metallic—and relate these structures to the properties and uses of materials, including carbon allotropes such as diamond, graphite, graphene, and fullerenes. Nanotechnology is introduced through examples that link structure, scale, and function. **Skills:** Through hands-on investigations and data analysis, pupils develop practical skills in separation techniques and chromatography. They gain confidence in interpreting melting point data and in using the periodic table to predict chemical behaviour. Pupils construct and interpret dot and cross diagrams for different types of bonding, calculate relative formula masses (Mr) and relative atomic masses (Ar), and apply surface area-to-volume ratio calculations to explain the behaviour of nanoparticles. The topic also supports the development of problem-solving and modelling skills, helping pupils make links between microscopic structure and macroscopic	Lesson: Modern periodic table with electron configuration | Higher | OCR | KS4 Chemistry | Oak National Academy Unit: Separating substances | KS4 Chemistry | Oak National Academy Unit: Chemistry of carbon | KS4 Chemistry | Oak National Academy Pure substances and mixtures - Separating mixtures - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Mendeleev's periodic table - Periodic table - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Forming ions - Chemical bonding - OCR Gateway - GCSE

		properties, and preparing them for more complex chemical reasoning later in the GCSE course. Pupils gain confidence in applying knowledge to unfamiliar scenarios and justifying their reasoning.	Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Diamond and graphite - Properties of materials - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Nanoparticles - Nanoparticles - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Multiple choice questions - Sample exam questions - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize
Assessments		A mid-unit low-stakes test and a more formal end-of-unit test completed under exam conditions. These assessments are designed to check understanding of key concepts and identify areas for improvement. Pupils receive feedback on both assessments, with time allocated in class to review answers and address misconceptions. Topic Summary Checklists are used throughout the unit to help pupils monitor their own progress and reflect on their understanding of the content.	
3	**9C4 Predicting and identifying**	**Knowledge:** The Key Stage 4 Reactants and Products topic builds pupils' understanding	Physical properties of the alkali metals - Chemical reactions of metals and non-metals - GCSE Chemistry (Single Science)

	reactions and products	of the periodic table, reactivity, and chemical testing. Pupils study the properties and reactions of Group 1 (alkali metals), Group 7 (halogens), Group 0 (noble gases), and transition metals, making connections between reactivity and electron structure. The topic also introduces chemical testing techniques for gases, metal ions (cations), and non-metal ions (anions), including flame tests, precipitation reactions, and sequential analysis using reagents. Pupils are introduced to the advantages of instrumental methods, such as mass spectrometry and infrared spectroscopy, and learn to interpret simple spectra. These concepts consolidate pupils' ability to identify unknown substances and understand trends across the periodic table. **Skills:** Through practical investigations and analysis, pupils develop their confidence in safely performing chemical tests, observing and recording outcomes, and drawing conclusions based on results. They carry out flame tests, gas tests, displacement reactions and precipitation reactions with increasing independence. Pupils learn to apply knowledge of atomic structure to predict reactivity and form ionic compounds. Mathematical skills are applied through writing chemical formulae and determining ionic charges. The topic also builds pupils' ability to interpret spectra, strengthening their capacity to engage with more advanced techniques in chemical analysis and laying the groundwork for quantitative and instrumental Chemistry later in the GCSE course.	Revision - OCR Gateway - BBC Bitesize Tests for gases - Identifying products - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize Multiple choice questions - Sample exam questions - purifying and identifying - OCR Gateway - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize
Assessments		A mid-unit low-stakes test and a more formal end-of-unit test completed under exam conditions. These assessments are designed to check understanding of key concepts and identify areas for improvement. Pupils receive feedback on both assessments, with time allocated in class to review answers and address misconceptions. Topic Summary Checklists are used throughout the unit to help pupils monitor their own progress and reflect on their understanding of the content.	

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Last updated: Spring Term 2025 by Mr A Warren