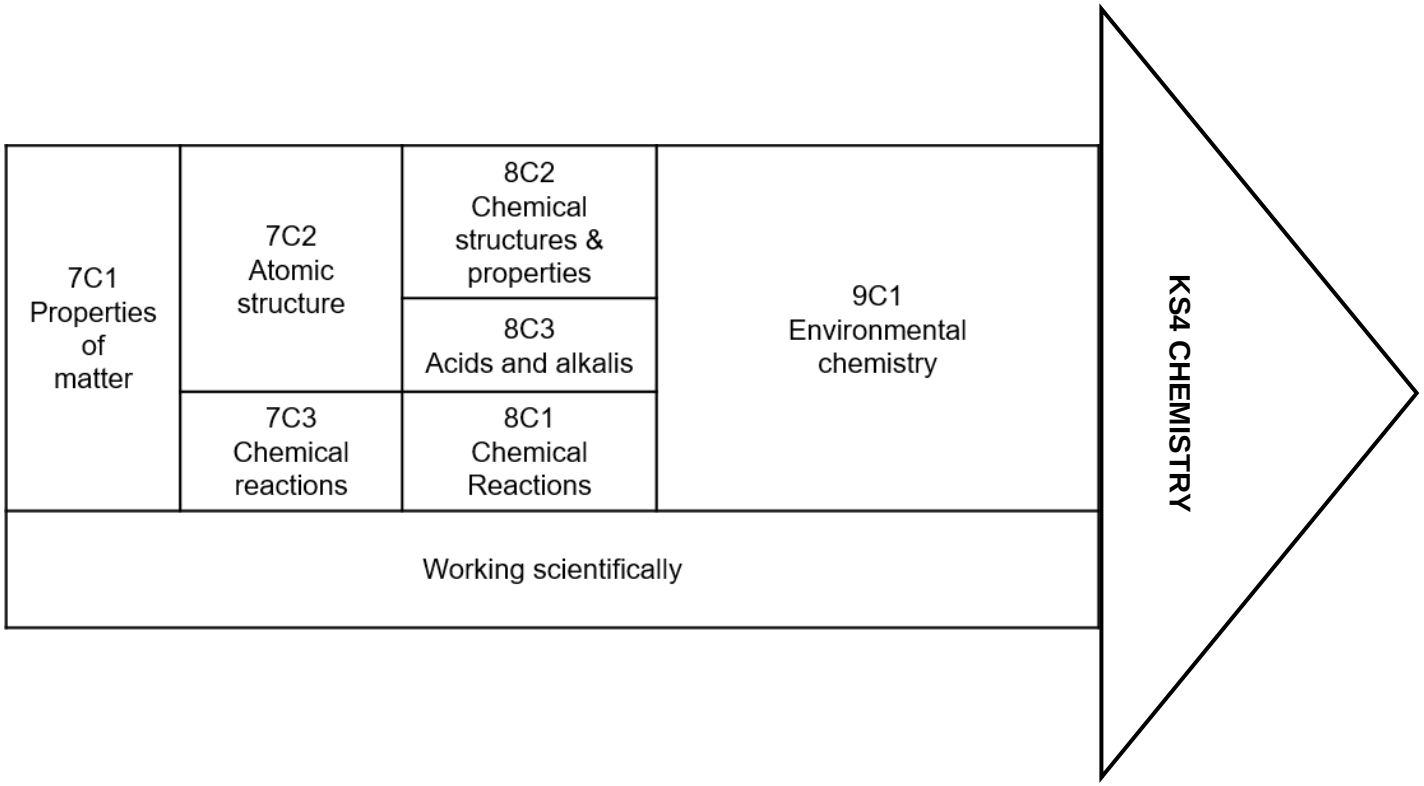
KS3 Chemistry – Curriculum overview



The above arrow shows the progression of chemistry topics across Key Stage 3. It shows how substantive knowledge is built upon in a sequential nature to prepare learners for KS4 chemistry. Running alongside and integrated throughout is the thread of working scientifically whereby students develop their knowledge of scientific methods, apparatus and data analysis.

KS3 Curriculum Intent - Chemistry

Intent **By the end of KS3 students are able to…**		**What new knowledge/content do we introduce?** **Year 7**	**Year 8**	**Year 9**	**How does this curriculum go beyond the National Curriculum? How does going beyond the NC ensure challenge?**
Move beyond knowledge of particles and into atoms, molecules and compounds. Apply this knowledge to explain the properties of different materials. Have a secure knowledge of the factors that change the rate of a reaction. Understand how chemistry can impact larger scale process such as global warming. Developed disciplinary knowledge to how evidence advanced understanding of atomic structure and to know which techniques to employ for a given purpose.	**Autumn**	**Properties of matter** • Particle models of solids, liquids gas and their arrangement relative to their properties. • Purity vs. mixtures • Methods of separation.	**Rates of reactions** • Understanding reactions in terms of bonds and collision theory. • Investigating factors that affect rate of reaction: concentration, temperature, surface area, catalysts. • Reversible reactions.	**Environmental chemistry** • The development and composition of the atmosphere. • Greenhouse gases and climate change. • Life cycle assessments. • Obtaining potable water.	Properties of matter: Paper chromatography applied to real world scenarios. Deciding the correct method for a given solution/mixture. Atomic structure: Reactivity within the periodic table and reference to subatomic particles. Chemical reactions: Introduction to collision theory as well as learning of thermal decomposition through demonstrations. Rates of reaction: Conducting experiments to investigate changing factors (beyond temperature) on rates of reaction. Chemical structures and properties: explaining properties of ceramics, polymers and composites in terms of their structure. Introduced to metallic, covalent and ionic bonding. Acids and alkalis: concentrated and dilute solutions.
	Spring	**Atomic structure** • The periodic table classifies all chemical elements and consists of groups and periods. • Trends of the periodic table. • How understanding of the atom has changed over time. • Structure of the atom with reference to subatomic particles, nuclei and shells.	**Chemical structures & properties** • Metals in the periodic table and common properties. • Salts as ionic compounds and common properties. • Formation of covalent bond and properties of simple covalent molecules. • Polymerisation • Allotropes of carbon and differences in properties	**Atomic structure** • Atomic structure including mass and charge of subatomic particles. • The history of the periodic table, including experimental evidence. • Use atomic structure to explain patterns and properties in the periodic table.	
	Summer	**Chemical reactions** • Physical vs. chemical change and word equations, including combustion. • Formation of salts and displacement reactions • Exothermic and endothermic reactions with reference to energy. • Thermal decomposition	**Acids & alkalis** • Acids and alkalis in terms of ions. • Measuring acids and the pH scale. • Health and safety, risk assessments, taking measurements and recording data • Concentration and dilute solutions. • Using acids to establish reactivity of metals.		

					Environmental chemistry: processes to obtain potable water and real world contexts. Atomic structure: experimental history of atomic structure, trends in the periodic table and knowledge of electron configuration.
	Rationale for this sequence	Year 7 begins by revisiting and consolidating knowledge of the particle model of matter. It furthers existing knowledge by exploring the arrangement of these particles in new terms (compressibility, density) and then focuses on methods of separation with attention to experimental method. Atomic structure then enables students to deepen their understanding by replacing knowledge of particles with atoms, molecules and compounds. Specifically, they build a foundation of atomic structure through an understanding of how the models have changed over time to arrive at our present day understanding. The summer term then placed atoms in the context of a chemical reaction. It looks at how atoms can be rearranged to form new products and the many contexts that such as reaction can occur.	In Year 8, students integrate their knowledge of atomic structure and chemical reactions to understand rates of reaction in the context of chemical bonds and collision theory. Students perform a series of experiments to investigate how factors alter the rate of reaction and use their theoretical knowledge to explain it. With an understanding of chemical reactions, students then further their knowledge by exploring how different types of bonding can produce different properties. Specifically, they are introduced to metallic, covalent and ionic bonding. Acids and alkalis are then explored with reference to ions. Students then utilise their knowledge of chemical reactions and the periodic table to establish a reactivity series of metals.	With a background in the nanoscopic nature of chemistry, Year 9 begins by allowing students to apply this knowledge on a macroscopic scale. Environmental chemistry employs the knowledge of molecules and compounds from Year 7 and 8, but applies it to the modern world by studying the atmosphere and greenhouse gases. It revisits the idea of purity and separation but in the context of a potable water in a changing world. The application of science in the real world helps both to consolidate learning and exemplify the importance of scientific contributions to society. The Spring term sees a return to atomic structure to develop understanding of the atom in more scientific terms. Here, students are introduced to the concepts of the mass and charge of subatomic particles and learn the experimental methods that equipped scientists with the knowledge they now learn. They apply their new knowledge of atomic structure with prior learning on chemical structures and properties to *explain* patterns in the periodic table.	
	How does the KS3 Curriculum build on previous	**KS2 students can:** • Compare and group materials based on properties • Know some materials dissolve in liquid and have some knowledge of changes of state. • Have some knowledge of how substances can be separated			

	learning at KS2?	**KS3 Students can:** • Explain how the properties of substances relate to the arrangement of their particles • Explain state changes in terms of energy and bonds and plot heating and cooling graphs • Be able to conduct experiments to separate mixtures, including simple distillation and chromatography.	