

Chemistry Curriculum: Mapping of Core Ideas through KS3 & KS4

The Science curriculum at Lutterworth College fosters resilience, curiosity, & critical thinking, encouraging students to question the world, solve problems logically, & evaluate evidence. Through teamwork during investigations, students develop effective communication, respect for diverse perspectives, & a mindset of perseverance & continuous improvement. Practical activities & data analysis tasks provide hands-on experience, building confidence in interpreting information & solving real-world problems. By addressing issues like health inequalities, climate change, & sustainability, students learn to use science as a tool for creating a fairer, more equitable world.

At its core, the curriculum celebrates the intrinsic value of science in helping us understand the world & our place in it. Students are inspired to appreciate the beauty of scientific discoveries & the role they play in shaping our lives. Beyond exams, the program aims to nurture lifelong curiosity, exploring everything from the smallest particles to the vastness of the universe. By engaging with models & investigations, students think scientifically & deepen their understanding of the natural world & human innovation, empowering them to contribute meaningfully to society.

POWERFUL IDEAS IN SCIENCE	Domain 1 <i>Matter is made of atoms; materials are made from “substances” at a microscopic scale</i>	Domain 2 <i>Chemical reactions rearrange atoms but conserve mass</i>	Domain 3 <i>The role of electrostatic forces (e.g., how substances hold together)</i>	Domain 4 <i>Disorder / entropy: reactions drive toward increased disorder</i>	Domain 5 <i>Quantities: using macroscopic vs sub-microscopic scales, e.g. moles</i>
Key Concepts	- Fundamental particles - Atoms, elements and compounds - Structure and bonding (ionic, covalent, metallic) - Intermolecular forces - Particle model (solids, liquids, gases) - Heating and phase changes - Pure and impure substances - Mixtures and formulations - Separation techniques (filtration, distillation, chromatography) - Chemical analysis (identifying substances)	- Chemical changes - Conservation of mass / atoms - Word and symbol equations - Balancing equations - Thermal decomposition - Combustion - Redox reactions - Electrolysis - Reactivity and displacement reactions - Limiting reagents - Percentage yield - Atom economy	- Structure and bonding - Ionic bonding (electrostatic attraction between ions) - Covalent bonding (shared electrons) - Metallic bonding - Intermolecular forces - Periodic table (electron arrangement) - Reactivity trends - Acids and bases (proton transfer) - Electrolysis (movement of ions and electrons)	- Energetics (endothermic and exothermic reactions) - Activation energy - Rate of reaction - Collision theory - Equilibrium (dynamic equilibrium) - Effect of temperature and pressure on equilibrium - Phase changes (energy input without temperature change)	- Molarity - The mole - Relative formula mass (RFM) - Concentration - Gas volumes - Yield and atom economy - Rate calculations - Energetics calculations - Quantitative chemical analysis
End Points	- Demonstrate a deep understanding of chemistry and how it relates to the real world - Conduct practical work safely and accurately - Visualise chemical and physical processes - Form reasoned and logical conclusions backed up with evidence - Manipulate mathematical equations				

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Year 7 KS3	C1.1 Particles Broken down knowledge covered: • The particle model • Changing state • Cooling curves • Brownian motion • Diffusion • Gas pressure • Density		C1.2 Atoms & Compounds Broken down knowledge covered: • The Periodic Table • Metals & Non-Metals • Reactivity of Metals		
	C1.2 Atoms & Compounds Broken down knowledge covered: • Atoms & Elements • Compounds • Naming Compounds & Formula • Making Iron Sulphide • Periodic Trends				
	C1.3 Mixtures Broken down knowledge including: • Mixtures & Pure Substances • Solutions • Melting Points, Boiling Points and Purity • Separating Mixtures • Distillation • Chromatography				
Assessments	End of Topic Quiz (20 Questions containing a Combination of short answer, multiple choice and skill-based questions) • C1.1 Particles • C1.2 Atoms & Compounds • C1.3 Mixtures				
	Internal Assessment: (Created from past KS3 questions including short answer, multiple choice and extended questions)				

	IA1: End of September: Introduction to Science/Skills Assessment IA2: May Core Content Assessment
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Year 8 KS3		C2.3 Earth’s Systems Broken down knowledge covered: • The Structure of the Earth • Igneous Rocks • Sedimentary Rocks • Metamorphic Rocks • The Rock Cycle • The Water Cycle • Water & Living Things • The Carbon Cycle • Air Pollution	C2.1 Acids & Alkalis Broken down knowledge covered: • The pH Scale • Indicators • Neutralisation • Making Salts • Acids & Metal Carbonates • Making Salts from Metal Carbonates		
		C2.2 Chemical Changes Broken down knowledge covered: • Chemical Changes • Conservation of Mass • Introduction to Balancing Equations • Balancing Equations • Oxidation & Reduction • Burning Magnesium • Reactions of Acids • Testing for Gases • Endothermic & Exothermic Reactions			
Assessments	End of Topic Quiz (20 Questions containing a Combination of short answer, multiple choice and skill-based questions) • C2.3 Earth’s Systems • C2.2 Chemical Changes • C1.3 Mixtures				
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Year 9 KS3/GCSE <i>(Separate Sciences Only)</i>	C3.1 Materials Broken down knowledge covered: • Ceramics & Composites • Polymers • Alloys	C3.1 Materials Broken down knowledge covered: • Reactivity Series • Extracting Metals • Displacement • Thermal Decomposition • Problems & Solutions	C1b The Periodic Table Broken down knowledge covered: • The Periodic table • Metals, nonmetals and Noble gases • Group 1 • Group 7 • Displacement reactions • <i>Transition metals</i>		C3a Quantitative chemistry Broken down knowledge covered: • Atom conservation + Balancing • Relative atomic mass • Change in mass • Uncertainty • Concentration
	C1a Atomic structure Broken down knowledge covered: • Atoms • Separating mixtures • Develop atomic models • Subatomic particles • Electron configuration				
Assessments	End of topic quiz: (20-mark tests created from GCSE past paper questions including short answer, multiple choice and extended questions) • B3.1: Materials • C1a: Atomic Structure • C1b: Periodic Table • C3a: Quantitative Chemistry				
	Internal Assessment: (Created from past KS3 questions and GCSE past paper questions including short answer, multiple choice and extended questions) IA1: Test reviewing the core content from KS3 IA2: Test of GCSE Content				

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Year 10 GCSE (Separate Sciences Only)	C10a The Earths Resources Broken down knowledge covered: • Potable water • Testing water • Copper extraction • Life cycle assessment • Recycling	C9 Chemistry of the Atmosphere Broken down knowledge covered: • Evolution of the atmosphere • Carbon dioxide levels • Greenhouse gases • Human activities • Global climate change • Carbon footprint • Pollutants and their effects	C2 Chemical Bonding Broken down knowledge covered: • Ionic bonding & properties • Covalent bonding • Simple covalent properties • Giant covalent properties • Metallic bonding and properties • Polymers • States of matter • <i>L9 Nanoparticles</i>		C8b Chemical Analysis 2 Broken down knowledge covered: • <i>Testing for cations</i> • <i>Testing for Anions</i> • <i>Identifying Unknowns</i> • <i>Instrumental analysis</i>
		C7a Organic Chemistry Broken down knowledge covered: • Alkanes • Properties of alkanes • Fractional distillation • Cracking and alkenes • Alkenes and combustion			
		C7b Further Organic Chemistry Broken down knowledge covered: • <i>Alkene reactions</i> • <i>Making Alcohols</i> • <i>Reactions of alcohols</i> • <i>Carboxylic acids</i> • <i>Addition polymerisation</i> • <i>Condensation polymerisation</i> • <i>Amino acids and DNA</i>			
Assessments	End of topic quiz: (20-mark tests created from GCSE past paper questions including short answer, multiple choice and extended questions) • C2 Chemical Bonding • C7a Organic Chemistry • <i>C7b Further Organic Chemistry</i> • <i>C8b Chemical Analysis 2</i>				

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| | <ul style="list-style-type: none">• C9 Chemistry of the Atmosphere• C10a The Earth's Resources |
| | <p>Internal Assessment: (Created from past KS3 questions and GCSE past paper questions including short answer, multiple choice and extended questions)</p> <p>IA1: Core Content Assessment</p> <p>IA2: Core Content Assessment</p> <p>End of Year 10 PPE: Bio/Chem/Phys Paper 1 Suite</p> |

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Year 11 GCSE <i>(Separate sciences only)</i>	C8a: Chemical Analysis Broken down knowledge covered: • Purity & Formulations • Chromatography • Chromatography (Practical) • Testing Gasses (Practical)	C4b Electrolysis Broken down knowledge covered: • The process of electrolysis • Molten electrolysis • Using electrolysis to extract metals • Electrolysis of aqueous solutions • Electrolysis Required Practical		C6a Rate of Chemical Reaction Broken down knowledge covered: • Collision Theory • Factors Affecting the Rate of Reaction • Rates of Reaction Graphs • Collecting a Volume of Gas • Observing a Colour Change	C3b Quantitative Chemistry Broken down knowledge covered: • Moles • Reacting masses • Limiting reagents • Percentage yield and atom economy • <i>Titration</i> • <i>Gas Calculations</i>
	C8b Chemical Analysis 2 Broken down knowledge covered: • <i>Required Practical Testing for cations</i> • <i>Required Practical Testing for Anions</i> • <i>Identifying Unknowns</i> • <i>Instrumental analysis</i>	C4a Chemical changes Broken down knowledge covered: • Metal oxides • The reactivity series • Displacement reactions • Extraction of metals and reduction • Reactions of acids with metals • Acids and insoluble bases	C5a Energy changes Broken down knowledge covered: • Energy transfer • Energy changes required practical • Energy profiles • Bond energies	C6b Extent of Chemical Reaction Broken down knowledge covered: • Reversible Reactions • Le Chatelier's Principle	C4a Chemical changes Broken down knowledge covered: • pH & Neutralisation • Strong vs weak acid
		C5a Energy changes Broken down knowledge covered: • Energy transfer • Energy changes required practical • Energy profiles • Bond energies			
		C5b Cells and batteries Broken down knowledge covered: • <i>Cells and batteries</i>			

		• <i>Hydrogen fuel cells</i>			
Assessments	End of topic quiz: (20-mark tests created from GCSE past paper questions including short answer, multiple choice and extended questions) • C3b: Quantitative Chemistry • C4a: Chemical Changes • C4b: Electrolysis • C5a: Energy Changes • C5b: Cells & Batteries • C8: Chemical Analysis				
	Internal Assessment: (Past GCSE Papers) PPE1: October (Bio/Chem/Phys Paper 1) PPE2: February (Bio/Chem/Phys Paper 2)				