

Herschel Grammar School
Chemistry Curriculum Overview 2024/25

Curriculum Intent
Science studies the world around us and tries to explain it through theory and investigation and by making evidence-based conclusions. Chemistry aims to give students an appreciation, knowledge and understanding of the world and more, using scientific method to think about and explain everyday phenomena. It aims to promote curiosity and develop learners' thinking skills. Learners will gain the skills to enable them to explore scientific ideas and ask questions to find out about how the particles in everything interact to produce the diversity in materials. Learners will develop a detailed understanding of how Chemistry underpins all matter and its role in sustainability and the development of new materials. Learners are encouraged to use what they learn to not take things at face value; they can use what they know to hypothesize, test and conclude.
Curriculum Impact
Regular assessment of knowledge and understanding allows pupils to know where their weaknesses lie and allows teachers to make necessary adjustments to ensure all pupils make good progress. Students become great thinkers, able to apply their knowledge to the unfamiliar to create novel solutions based on good science.

Through education, we have the privilege of engaging directly with children and young people who:

- are passionate about the natural world
- want to do their best to protect it
- can influence their wider communities

Throughout this document, whenever the following icon is used , it indicates that the teaching and learning is linked to one or more of the following:

- nature
- the causes and impacts of climate change
- careers in the green economy
- the importance of sustainability

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Year group	9
Rationale for sequencing	This follows the National Curriculum but is modified to ensure that key ideas from Key Stage 3 are either returned to or introduced within the GCSE content. Topics follow a logical order that provides a pathway that takes students from particle ideas in years 7 and 8 to how interactions and changes within atoms affect the chemistry of matter. Topic C1 is fundamental to understanding further topics and introduces the atomic level of understanding. C5 is taught before C4 and parts of C3 to return to Y8 topics but also to remain focused on the chemistry of ionically bonded substances.
Term 1	
Half term 1a	Half term 1b
C1 Atomic structure Atoms, Elements and Compounds Structure of the Atom History of the Atom Electronic structures Isotopes Balancing Equations	C1 Separating Techniques Filtration Distillation Paper chromatography Crystallisation C2 The Periodic Table Development of the Periodic Table Group 1 Group 0 and trends in the Periodic Table
Term 2	
Half term 2a	Half term 2b
C2 The Periodic Table Group 7 The transition elements 🌐 Explaining reactivity trends C3 Structure and Bonding Changes of state Limitations of particle models	C3 Structure and Bonding Ions Ionic bonding Explaining the properties of ionic compounds Metallic bonding
Term 3	
Half term 3a	Half Term 3b
C3 Structure and Bonding Explaining the properties of metals C5 Chemical Changes The reactivity series Displacement reactions Extracting metals 🌐	C5 Chemical Changes Salts from metals Salts from insoluble bases Other ways of making salts

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Key Assessment Plans:	Tests start as are end of topic but increasingly include content from prior learning. Regular mini-tests and other forms of assessment.
Term 1	Atomic structure assessment in first half-term C1 test in November
Term 2	C2 end of topic test including explanation for reactivity trends late January/early February Longer test covering all Y9 content
Term 3	C3 end of topic test Longer test covering all Y9 content

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Year group	Year 10
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Rationale for sequencing	Students regularly confuse the properties of ionic and covalently bonded substances and teaching of the latter is kept separate. Topics in Paper 1 of the GCSE mainly focus on the chemistry of ionically bonded substances and teaching aims to emphasize and link back to the properties of these compounds. Covalent bonding links well to the properties of organic compounds and is introduced alongside those topics.
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Term 1	
Half term 1	Half term 2
C5 Chemical Changes Review of salts topic Required Practical: Making salts Neutralisation and pH Strong and weak acids Concentration as particles per unit volume 🌍 C6 Electrolysis Electrolysis of liquids Electrolysis of solutions Required Practical: Electrolysis Electrolysis of aluminium 🌍	C7 Energy Changes Exothermic and endothermic reactions Reaction profiles Required Practical: Temperature changes Bond energy calculations Chemical cells and batteries 🌍 Fuel cells 🌍
Term 2	
Half term 1	Half term 2
C4 Chemical Calculations Relative masses and Moles Moles and mass Moles and volume Moles and concentration Required practical: Titration	C4 Chemical Calculations Yield 🌍 Atom economy 🌍 C3 Structure and Bonding Covalent bonding Properties of simple molecules C9 Crude Oil and Fuels Fractional distillation of crude oil 🌍 Hydrocarbons and their properties 🌍
Term 3	
Half term 1	Half Term 2
C3 Structure and Bonding Properties of giant covalent substances Fullerenes and graphene 🌍 Nanoscience 🌍	C9 Crude Oil and Fuels Combustion of hydrocarbons 🌍 C13 The Earth's Atmosphere The development of Earth's atmosphere Greenhouse gases 🌍 Climate Change 🌍 Pollution 🌍

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Assessment Plans:	Tests will cover previous topics, including those in Y9. Regular mini-tests and other forms of assessment.
Term 1	First all-topic test in November with shorter end of topic tests as appropriate
Term 2	All-topic test in January with shorter end of topic tests as appropriate
Term 3	2 long exams. 90 min+ exam in April (in exam hall). Second long test late June/early July. Assessments in the final term are used to determine Combined Science entry.

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Year group	11
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Rationale for sequencing	Topic C9 is split to place its content alongside other related topics. C13 is taught before C8 to place the atmosphere content alongside that of burning fuels. Cracking is placed with other organic content to help link them. The Haber process is placed with C8 because it is an example of the application of the theory covered.
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Term 1	
Half term	Half term
C8 Rates and Equilibrium Collision Theory Effect on rate of reaction of temperature, surface area, catalysts and concentration Required Practical: Effect of Concentration on Rate Energy and reversible reactions 🌐 Dynamic equilibrium C15 Using our Resources The Haber Process (15.5 and 15.6) 🌐	C9 Crude Oil and Fuels Cracking 🌐 C10 Organic Reactions Reactions of alkenes C11 Polymers Addition polymers 🌐 C15.3 Using our Resources Polymer Properties 🌐
Term 2	
Half term	Half term
C10 Organic Reactions Alcohols, Carboxylic Acids and Esters Condensation polymers 🌐 Natural Polymers 🌐 DNA C12 Chemical Analysis Pure substances Required Practical: Chromatography Tests for gases Tests for anions and cations Required Practical: Identifying unknowns Instrumental analysis	C14 The Earth's Resources Finite vs Renewable 🌐 Water treatment 🌐 Required Practical: Water Metal extraction from low-grade ores 🌐 Life cycle assessments 🌐 Reduce, reuse, recycle 🌐 C15 Using our Resources Rusting Alloys Glass, ceramics and composites 🌐 Making fertilisers in the lab 🌐 Making fertilisers in industry 🌐
Term 3	
Half term	Half Term
Revision	Revision Study leave – dependent on GCSE date

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Key Assessment Plans:	Summative assessments (tests) will cover previous topics, including those in Y9 and 10. Regular mini-tests and other forms of assessment.
Term 1	2 x tests, one each half term including 'mocks' in December.
Term 2	2 x tests, one each half term with second 'mock' style paper just before Easter break.
Term 3	GCSEs and revision testing

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Year group	12
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Rationale for sequencing	Modules are split between two teachers. One teacher covers the organic chemistry and initial quantitative content, the other the physical and inorganic chemistry content. When there is an overlap, content is covered when necessary to provide a coherent and logical structure to learning and some sequencing has been adjusted to separate topics that are often confused with each other. Practical work is placed to happen alongside the relevant theory. Lessons regularly refer back to prior knowledge and understanding to ensure that students can see how content is linked and builds from fundamental principles into one large understanding of chemical concepts.
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Term 1	
Half term 1	Half term 2
Atomic structure and isotopes Bonding and Structure Formulae and equations Calculations involving masses and volumes  Shapes of molecules Electronegativity and bond polarity Intermolecular forces The Periodic table and Periodicity Calculations involving gases	Ionic Equations Acids, bases and neutralisation Redox Group 2 and 7 Calculations involving concentrations  Qualitative tests for ions Basics concepts and hydrocarbons  IUPAC nomenclature Structural isomerism Different ways of writing formulae Alkanes
Term 2	
Half term 1	Half term 2
Alkenes E/Z-stereoisomerism Enthalpy changes  Chemical equilibria 	Further calculations Chemical equilibria K_c and K_p calculations Rates of reaction  Haloalkanes
Term 3	
Half term 1	Half Term 2
Environmental Chemistry  Further rates of reaction	Alcohols Transition metals part 1 

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Key Assessment Plans:	Tests will follow topics and will increasingly contain content from earlier topics. Regular mini-tests and other forms of assessment.
Term 1	Atomic structure test, calculations tests, structure and bonding test
Term 2	Organic test, alkanes and naming test, Periodic Table and trends test, enthalpy changes test. One 90 min+ exam during w/b 16 – 13 March
Term 3	Topic tests and two 90 min exams tests in June.

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Year group	13
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Rationale for sequencing	As with Y12, modules are split between two teachers. One teacher covers solely the organic chemistry and the other everything else. When there is an overlap, content is covered when necessary to provide a coherent and logical structure to learning. Practical work is placed to happen alongside the relevant theory. Lessons regularly refer back to prior knowledge and understanding to ensure that students can see how content is linked and builds from Y12 to one large understanding of chemical concepts. This sequence aims to complete all topics by the end of the first half of the second term so that the mock exam can test all content.
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Term 1	
Half term	Half term
Transition metals part 2 Carbonyl compounds Infrared spectroscopy Mass spectroscopy Carboxylic Acids and derivatives Acid-base theory K_a , K_w and pH calculations	Proton and carbon-13 nmr spectroscopy Chromatography Buffers Titration curves and indicators Aromatic compounds
Term 2	
Half term	Half term
Redox and electrode potentials Storage and fuel cells  Lattice enthalpy Entropy Free energy Nitrogen Compounds Polymers 	Mock exams Revision
Term 3	
Half term	Half Term
Revision	Revision

Key Assessment Plans:	
Term 1	Topic tests and one larger exam covering content to date in November.
Term 2	Mock exams (all three papers) and topic tests.
Term 3	Many short assessments with many designed around weaknesses from mock exams.