

**Overview:**

Students have 5 chemistry lessons a fortnight during which we develop increasingly complex and demanding chemistry concepts, processes and skills. A range of topics are taught, which build on the learning from Year 9. Independent learning is set every week which follows learning in lessons so students have the chance to revisit and embed knowledge. We have three big assessments in the year and leading up to these assessments we have revision lessons where we teach and develop good revision techniques.

**Careers in the Curriculum:**

The topics covered will highlight links to careers in chemical engineering, water treatment, environmental chemistry, sustainability, atmospheric chemistry.

Term	Topic	Assessment
Aut1	C6 - Rate and extent of chemical change <ul style="list-style-type: none"> <li>• How to measure the rate of a reaction</li> <li>• Collision theory</li> </ul> Factors affecting rate of reaction <ul style="list-style-type: none"> <li>• Dynamic equilibrium</li> <li>• Le Chatelier's principle</li> </ul>	Aiming High 1 test in mid-October assessing all of the topics taught up to that point.
Aut2	C7 - Organic chemistry <ul style="list-style-type: none"> <li>• Crude oil and hydrocarbons</li> <li>• Fractional distillation and properties of hydrocarbons</li> <li>• Cracking and alkenes</li> <li>• Reactions of alkenes</li> <li>• Alcohols and carboxylic acids</li> <li>• Synthetic and naturally occurring polymers</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
Spr1	C8 - Chemical analysis <ul style="list-style-type: none"> <li>• Purity and formulations</li> <li>• Chromatography</li> <li>• Identification of common gases</li> <li>• Identification of ions by chemical and spectroscopic means</li> </ul>	Aiming High 2 test in late January assessing all of the topics taught up to that point.
Spr2	C9 - Chemistry of the atmosphere <ul style="list-style-type: none"> <li>• Composition and evolution of the Earth's atmosphere</li> <li>• Carbon dioxide and methane as greenhouse gases</li> <li>• Global climate change and carbon footprint</li> <li>• Common atmospheric pollutants and their sources</li> </ul> C10 - Using resources <ul style="list-style-type: none"> <li>• Using Earth's resources and obtaining potable water</li> <li>• Life cycle assessment and recycling</li> <li>• Using materials</li> <li>• The Haber process and use of NPK fertilisers</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
Sum1	C3 - Quantitative chemistry <ul style="list-style-type: none"> <li>• Conservation of mass and interpretation of chemical equations</li> <li>• Amount of substance and the mole</li> <li>• Limiting reactants</li> <li>• Concentrations of solutions</li> <li>• Percentage yield and atom economy</li> <li>• Amount of substance in relation to volumes of gases</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
Sum2	C3 - Quantitative chemistry <ul style="list-style-type: none"> <li>• Concentrations of solutions</li> <li>• Percentage yield and atom economy</li> <li>• Amount of substance in relation to volumes of gases</li> </ul>	PPE in mid-June assessing all of the topics taught up to that point.

**Overview:**

Students are taught the final topics from GCSE chemistry. Lessons focus on developing application, analytical and data processing skills by using past paper questions as part of lessons. Required practicals are carried out alongside regular practicals so we continue to develop practical skills. Independent learning continues to be set each week which supports retention of knowledge and skills developed in lessons. We have two major assessments in the year, and of course the big focus is the final exam in the summer. Revision lessons precede these assessments where we refine revision skills and hone knowledge and techniques.

**Careers in the Curriculum:**

The topics covered will highlight links to careers in chemical metallurgy, nanoscience, sustainability and green chemistry, forensic chemistry and food science.

Term	Topic	Assessment
<b>Aut1</b>	C3 - quantitative chemistry <ul style="list-style-type: none"> <li>• Concentrations of solutions</li> <li>• Percentage yield and atom economy</li> <li>• Amount of substance in relation to volumes of gases</li> </ul> C4 - Chemical changes <ul style="list-style-type: none"> <li>• The reactivity series</li> <li>• Ionic equations</li> <li>• Extraction of metals by reduction</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
<b>Aut2</b>	C4 - Chemical changes <ul style="list-style-type: none"> <li>• Electrolysis</li> <li>• Extraction of aluminium</li> <li>• Making salts</li> </ul>	Aiming High 1 test in early November assessing all of the topics taught up to that point.
<b>Spr1</b>	C4 - Chemical changes <ul style="list-style-type: none"> <li>• pH and neutralisation</li> <li>• Titration and associated calculations</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
<b>Spr2</b>	C5 - Energy changes <ul style="list-style-type: none"> <li>• Endothermic and exothermic reactions</li> <li>• Energy profiles</li> <li>• Bond enthalpies</li> <li>• Cells</li> <li>• Fuel cells</li> </ul>	PPE in mid-February assessing all of the topics taught up to that point.
<b>Sum1</b>	Revision <ul style="list-style-type: none"> <li>• Past paper revision questions to practice techniques including evaluate, compare and data interpretation questions.</li> <li>• Review of all topics</li> </ul>	Formative assessment in class through the use of show me boards and questioning.
<b>Sum2</b>	Revision and exam preparation	Final exams.

**Overview:**

Year 12 Chemistry builds on the knowledge and skills developed at GCSE. Topics will feel familiar but the depth of knowledge will be greater so a more intensive lesson preparation and review is initiated. In some topics students are given pre-reading tasks for lessons and may be expected to produce notes. Independent learning tasks are set weekly to embed learning. Practical work is carried out throughout the whole year with skills developed and stretched. Practical competency is monitored by the completion of series of set tasks which are written up in a lab book.

**Careers in the Curriculum:**

The topics covered will highlight links to careers in chemical engineering, environmental/green chemistry, medicine, dentistry.

Term	Topic	Assessment
Aut1	Physical chemistry: <b>Unit 1.1 - Atomic structure</b> - Structure of the atom, isotopes and time of flight (TOF) mass spectrometry. <b>Unit 1.2 - Amount of substance</b> - Avogadro's constant, the mole and associated calculations, empirical and molecular formula, ideal gas equation. <b>Unit 1.3 - Bonding</b> - Ionic, covalent and metallic bonding and structures, shapes of molecules and intermolecular forces.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Aut2	Physical chemistry: <b>Unit 1.4 - Energetics</b> - Understanding and calculation of energy changes in reactions <b>Unit 1.6 Equilibria</b> - Le Chatelier's principle and Kc. <b>Unit 1.7 - Redox</b> - Oxidation and reduction in terms of electrons. Inorganic chemistry: <b>Unit 2.1 - Periodicity</b> - Trends in physical and chemical properties <b>Unit 2.3 - Group 7</b> - Trends in physical and chemical properties and how these link to their uses.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Spr1	Inorganic chemistry: <b>Unit 2.2 - Group 2</b> - Trends in physical and chemical properties and how these link to their uses. Physical chemistry: <b>Unit 1.5 - Kinetics</b> - The study of how fast chemical reactions proceed and how this can be manipulated. Organic chemistry: <b>Unit 3.1 - Introduction to organic chemistry</b> - Naming, free radical substitution, structural isomerism and E-Z isomerism	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Spr2	Organic chemistry: <b>Unit 3.2 - Alkanes</b> - Fractional distillation, cracking, combustion and chlorination. <b>Unit 3.3 - Halogenoalkanes</b> - Nucleophilic substitution, elimination, ozone depletion. <b>Unit 3.4 - Alkenes</b> - Structure, bonding, reactivity and electrophilic addition. <b>Unit 3.5 Alcohols</b> - Production, oxidation and elimination.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Sum1	Organic chemistry: <b>Unit 3.6 - Organic analysis</b> - test tube reactions, mass spectrometry and infra-red spectroscopy. Moving onto year 2 material. Physical chemistry: <b>Unit 1.8 - Thermodynamics</b> - Born Haber cycles, entropy. Organic chemistry: <b>Unit 3.15 NMR</b> - deduction of structure of compounds using nuclear magnetic resonance spectroscopy.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Sum2	Revision Organic chemistry: <b>Unit 3.16 - Chromatography</b> - thin layer, column and gas chromatography. <b>Unit 3.7 Optical isomerism</b> - form of stereoisomerism.	Pre-Public Exams (PPEs) in mid June covering all of the learning from year 1 of A level Chemistry (units 1.1-1.7, 2.1-2.3 and 3.1-3.6)

**Overview:**

Year 13 chemistry continues in the same fashion as Year 12 but with more complex topics that require students to use a wider range of multidisciplinary knowledge. We focus on developing application and investigative skills in Year 13 developing ever more critical thinking. Independent learning tasks are set weekly to embed learning. Practical work is carried out throughout the whole year with skills developed and stretched. Practical competency is monitored by the completion of series of set tasks which are written up in a lab book.

**Careers in the Curriculum:**

The topics covered will highlight links to careers in pharmacy, forensic science, medicinal chemistry, astrochemistry, materials science.

Term	Topic	Assessment
Aut1	Physical chemistry <b>Unit 1.11 - Electrode potentials &amp; electrochemical cells</b> - EMF, commercial applications of electrochemical cells. <b>Unit 1.12 - Acids &amp; bases</b> - pH curves, titration, indicators, acid-base and buffer calculations.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Aut2	Physical chemistry: <b>Unit 1.9 - Rate equations</b> - Using the mathematical relationship between rate and concentration to deduce information about reaction mechanisms. <b>Unit 1.10 - K<sub>p</sub></b> - Equilibrium constant in gaseous reactions. Inorganic chemistry: <b>Unit 2.5 - Transition metals</b> - Physical and some chemical properties. <b>Unit 2.6 Reactions of ions in aqueous solutions</b> - using test tube reactions to identify transition metals. Organic chemistry: <b>Unit 3.8 - Aldehydes &amp; ketones</b> - Chemical tests, nucleophilic addition. <b>Unit 3.11 - Amines</b> - Properties and reactions of compounds based on ammonia.	Progress tests at the end of each term to assess progress.  Practical skills assessed in lessons.
Spr1	Continuation of Inorganic chemistry: <b>Unit 2.5 - Transition metals</b> <b>Unit 2.6 Reactions of ions in aqueous solutions</b> Organic chemistry: <b>Unit 3.9 - Carboxylic acids and derivatives</b> - Esters, biodiesel and acylation. Revision	Pre-Public Exams (PPEs) in late January covering all of the learning from year 1 and 2 of A-level Chemistry (A Level papers 1 and 2)
Spr2	Organic chemistry: <b>Unit 3.10 - Aromatic chemistry</b> - properties and reactions of benzene <b>Unit 3.12 - Polymers</b> - properties, uses and problems with condensation polymers. <b>Unit 3.13 - Amino acids, DNA &amp; proteins</b> - structure and bonding and drug action. <b>Unit 3.14 - Organic synthesis</b> - multi-step syntheses	Practical skills assessed in lessons.
Sum1	Revision. Revisiting all required practicals, reviewing topics from throughout the 2 year course.	In class completion of a paper 3. Past exam papers set weekly, self marked and completion checked.
Sum2	Revision and exam preparation.	Final exams.