

## KS5 Curriculum Overview (CHEMISTRY)

### Year 12

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<b>Topic 1: Atomic Structure and the Periodic Table</b> <b>Topic 2: Bonding and Structure</b> <b>Topic 3: Redox I</b>	<b>Physics Link</b> <b>Math Link: Mathematical skills</b> <ul style="list-style-type: none"> <li>calculating a relative atomic mass from isotopic composition data, using simple probability to</li> <li>calculate the peak heights for the mass spectrum of chlorine molecules, using</li> <li>logarithms to compare successive ionisation energies for an element.</li> <li>investigate relationships, such as between the magnitude of ionization.</li> <li>representing shapes of molecules with suitable sketches, plotting data to investigate trends in boiling temperatures of alkanes.</li> <li>consider the strengths and weaknesses of the models used to describe different types of bonding. As part of their study of 6 electron-pair repulsion theory, students can see how chemists can make generalisations and use them to make predictions</li> <li>using an algebraic method to work out the oxidation number of an element within a complex species,</li> <li>balancing equations for redox reactions by combining ionic half-equations.</li> </ul>	<b>Career links</b> Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher. <b>British Values</b> <b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges. <b>Individual Liberty</b> – within Core practical activities all students have to work independently. <b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others. <b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. <b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 2 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<b>Topic 4: Inorganic Chemistry and the Periodic Table</b> <b>Topic 5: Formulae, Equations and Amounts of Substance</b>	<b>Physics Link</b> <ul style="list-style-type: none"> <li>investigating displacement reactions in the halogens</li> <li>Mathematical skills - manipulating data on the solubility of hydroxides.</li> <li>Using data to make predictions based on patterns and relationships.</li> </ul>	<b>Career links</b> Laboratory Technicians, Research Chemists, Chemical Engineering, <b>British Values</b> <b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges <b>Individual Liberty</b> – within Core practical activities all

	<ul style="list-style-type: none"> <li>▪ converting between units such as cm<sup>3</sup> and dm<sup>3</sup>, using standard form with the Avogadro constant,</li> <li>▪ rearranging formulae for calculating moles in solids and in solutions, calculating</li> <li>▪ atom economy, dealing with percentage errors.</li> </ul> <p><b>Consider ideas of:</b></p> <ul style="list-style-type: none"> <li>▪ measurement uncertainty, evaluating their results in terms of systematic and random errors. They can also consider how the concept of atom economy is useful to help chemists make decisions so that reactions can be made more efficient in terms of resources.</li> </ul>	<p>students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p> <p><b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.</p>
TERM 3 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p>Topic 2: Bonding and Structure</p> <p>Topic 3: Redox I</p> <p>Topic 6: Organic Chemistry I</p>	<p><b>Physics Link</b></p> <ul style="list-style-type: none"> <li>▪ Mathematical include</li> <li>▪ Representing shapes of molecules with suitable sketches, plotting data to investigate trends in boiling temperatures of alkanes.</li> <li>▪ Consider the strengths and weaknesses of the models used to describe different types of bonding. As part of their study of electron-pair repulsion theory, students can see how chemists can</li> <li>▪ make generalisations and use them to make predictions.</li> <li>▪ Mathematical skills include</li> <li>▪ calculating the yield of a reaction or an atom economy.</li> <li>▪ Students can consider how the polymer industry provides useful solutions for many modern applications, but poses questions about sustainability of resources and the feasibility of recycling.</li> <li>▪ chemistry, showing them how chemists work safely with potentially hazardous chemicals by managing risks</li> </ul>	<p><b>Career links</b></p> <p>Research Chemists Chemical Engineering project engineers development chemists laboratory technicians technical associates research analysts Chemistry teacher, Medical professions</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges.</p> <p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p> <p><b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p>

		Listening to others responses to answers and being willing to play their part.
TERM 4 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<b>Topic 8: Energetics I</b> <b>Topic 7: Organic Chemistry I</b>	<b>Physics &amp; Math Links:</b> <b>Mathematical skills include</b> <ul style="list-style-type: none"> <li>calculating the yield of a reaction or an atom economy.</li> <li>Students can consider how the polymer industry provides useful solutions for many modern applications, but poses questions about sustainability of resources and the feasibility of recycling.</li> <li>chemistry, showing them how chemists work safely with potentially hazardous chemicals by managing risks</li> </ul> <b>Mathematical skills</b> <ul style="list-style-type: none"> <li>include plotting and extrapolating graphs of temperature rise against time for displacement reactions,</li> <li>calculating enthalpy changes in J and in kJ mol<sup>-1</sup>, using algebra to solve Hess's law problems,</li> <li>calculating enthalpy changes using bond enthalpies.</li> </ul>	<b>Career links</b> Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher, Medical professions. <b>British Values</b> <b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges. <b>Individual Liberty</b> – within Core practical activities all students have to work independently. <b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others <b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. <b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
TERM 5 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<b>Topic 9: Kinetics I</b> <b>Topic 10: Equilibrium I</b> <b>Topic 6: Organic Chemistry I</b> <b>Topic 7: Modern Analytical Techniques I</b>	<b>Math Link</b> <b>Mathematical skills include</b> <p>calculating the yield of a reaction or an atom economy.</p> <p>Students can consider how the polymer industry provides useful solutions for many modern applications, but poses questions</p>	<b>Career links</b> Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher.

	<p>about sustainability of resources and the feasibility of recycling.</p> <p>chemistry, showing them how chemists work safely with potentially hazardous chemicals by managing risks</p> <p>analysing fragmentation patterns in mass spectra.</p> <p>Within this topic, students can consider how different instrumental methods can provide evidence for analysis. They can see how accurate and sensitive methods of analysis can be applied to the study of chemical changes, but also to detect drugs such as in blood or urine testing in sport</p> <p><b>Mathematical skills</b></p> <p>deriving an algebraic expression for the equilibrium constant.</p> <p>Consider an appreciation of equilibrium processes, coupled with kinetics, can lead chemists to redevelop manufacturing processes to make them more efficient.</p>	<p>Medical professions</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges.</p> <p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p> <p><b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.</p>
TERM 6 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p>Topic 11: Equilibrium II</p> <p>Topic 14: Redox II</p> <p>Topic 19: Modern Analytical Techniques II</p>	<p><b>Math Link</b></p> <p><b>Mathematical skills that could be developed in this topic include:</b></p> <ul style="list-style-type: none"> <li>Constructing expressions for <math>K_c</math> and <math>K_p</math> and calculating values with relevant units, estimating the</li> <li>change to the value of an equilibrium constant when a variable changes.</li> <li>Within this topic, students can consider how chemists can use the concept of</li> <li>equilibria to predict quantitatively the direction and extent of chemical change.</li> </ul> <p>Students consider how ideas developed in different contexts within chemistry can be shown to be related to a major explanatory principle.</p> <p>Students consider how chemists continue to search for alternative sources of energy, through the development of fuel cells.</p>	<p><b>Career links</b></p> <p>Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher.</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges.</p> <p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that</p>

	Students consider a wider range of instrumental methods used for analysis and see how this technique is used in medicine through MRI scans.	they have to listen as well discuss their own opinions. <b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others responses to answers and being willing to play their part.
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## KS5 Curriculum Overview (CHEMISTRY)

### Year 13

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p><b>Topic 12: Acid-base Equilibria</b>  <b>Topic 17: Organic Chemistry II</b></p>	<p><b>Mathematical skills developed in this topic include</b></p> <ul style="list-style-type: none"> <li>logarithms and exponentials for converting from concentration to pH and vice versa,</li> <li>rearranging <math>K_a</math> expressions into expressions suitable for calculating pH of a buffer solution, plotting and interpreting titration curves.</li> <li>Consider the historical development of theories explaining acid and base behaviour show that scientific ideas change as a result of new evidence and fresh thinking.</li> <li>Relate their study of buffer solutions to a range of applications in living cells, medicines, foods and the natural environment</li> </ul> <p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>representing chiral molecules with appropriate diagrams, calculating percentage yields and experimental errors.</li> </ul> <p><b>Students can consider</b></p> <ul style="list-style-type: none"> <li>how organic synthesis can produce a variety of important materials, such as esters for solvents, flavourings and perfumes.</li> </ul>	<p><b>Career Links</b>  The use of buffer solutions in Surgery,  Research Chemists,  Chemical Engineering,  project engineers,  development chemists,  laboratory technicians,  technical associates,  research analysts,  Chemistry teacher.</p> <p><b>British Values</b>  <b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges  <b>Individual Liberty</b> – within Core practical activities all students have to work independently.  <b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.  <b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.  <b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.  Listening to others responses to answers and being willing to play their part.</p>

TERM 2 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p>Topic 13: Energetics II Topic 17: Organic Chemistry II</p>	<p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>calculating the missing value from a Born-Haber cycle using algebraic expressions, using natural logarithms when calculating an equilibrium constant from <math>\Delta G</math>.</li> </ul> <p><b>Students consider</b></p> <ul style="list-style-type: none"> <li>how chemists evaluate theoretical models by comparing the real and ideal properties of chemicals, for example in the study of theoretical and experimental lattice energies. The study of entropy shows students</li> <li>how chemists use formal, abstract thinking to answer fundamental questions about the stability of chemicals and the direction of chemical change.</li> </ul> <p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>representing chiral molecules with appropriate diagrams, calculating percentage yields and experimental errors.</li> </ul> <p><b>Students can consider</b></p> <ul style="list-style-type: none"> <li>how organic synthesis can produce a variety of important materials, such as esters for solvents, flavourings and perfumes.</li> </ul>	<p><b>Career links</b></p> <p>Chemical Engineering, Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher.</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges.</p> <p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p> <p><b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.</p>
TERM 3 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p>Topic 15: Transition Metals Topic 18: Organic Chemistry III Topic 16: Kinetics II</p>	<p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>investigating the geometry of different transition metal complexes.</li> <li>They can also appreciate that catalyst research is a frontier area, and one which provides an opportunity to show how the scientific community reports and validates new knowledge.</li> </ul> <p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>plotting and justifying the shapes of rate–concentration and concentration–time graphs,</li> </ul>	<p><b>Career links</b></p> <p>Chemical Engineering, Medical Sciences, Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher.</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges</p>

	<ul style="list-style-type: none"> <li>calculating half-life of a reaction, calculating activation energy from a suitable graph, rearranging the Arrhenius equation in the form <math>y = mx + c</math>.</li> <li>Consider different methods used to measure reaction rates and collect valid data.</li> <li>Analysis of data, and a knowledge of rate equations, they can see how chemists are able to propose models to describe the mechanisms of chemical reactions.</li> </ul> <p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>calculating the resonance stability of benzene from thermodynamic data, calculating percentage yields.</li> </ul> <p><b>Within this topic, students can</b></p> <ul style="list-style-type: none"> <li>consider how the model for benzene structure has developed in response to new evidence.</li> </ul>	<p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p> <p><b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.</p>
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<p><b>Topic 16: Kinetics II</b>  <b>Topic 18: Organic Chemistry III</b></p>	<p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>calculating the resonance stability of benzene from thermodynamic data, calculating percentage yields.</li> </ul> <p><b>Within this topic, students can consider</b></p> <ul style="list-style-type: none"> <li>consider how the model for benzene structure has developed in response to new evidence.</li> </ul> <p><b>Mathematical skills include</b></p> <ul style="list-style-type: none"> <li>investigating the geometry of different transition metal complexes.</li> </ul>	<p><b>Career links</b></p> <p>Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher.</p> <p><b>British Values</b></p> <p><b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges.</p> <p><b>Individual Liberty</b> – within Core practical activities all students have to work independently.</p> <p><b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others.</p> <p><b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions.</p>



		<b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others responses to answers and being willing to play their part.
<b>TERM 5 TOPIC/s</b>	▪ <b>*Key Skills/Subject Links</b>	<b>*Career links &amp; BV</b>
Revision of most required subjects and practice for Examinations		<b>Career links</b> Research Chemists, Chemical Engineering, project engineers, development chemists, laboratory technicians, technical associates, research analysts, Chemistry teacher. <b>British Values</b> <b>Tolerance</b> – acceptance of differing opinions on how to answer questions and resolve challenges. <b>Individual Liberty</b> – within Core practical activities all students have to work independently. <b>Rule of Law</b> – Students have to follow strict safety guidance to ensure their own safety and for the safety of others. <b>Democracy</b> – When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. <b>Mutual respect</b> - When completing pair and team challenges realizing that they have to listen as well discuss their own opinions. Listening to others' responses to answers and being willing to play their part.
<b>TERM 6 TOPIC/s</b>	▪ <b>*Key Skills/Subject Links</b>	<b>*Career links &amp; BV</b>
Examinations	N/A	N/A