

## 2022-2023 Year 13 Curriculum and Assessment Plan for Chemistry

The curriculum and assessment of pupils at this stage of education has been carefully designed to enable them to deepen their understanding of how chemical processes and concepts underpin our understanding of the universe around us. It begins with establishing a strong foundation by focussing on the fundamental principles of chemistry. The students then consolidate and expand their knowledge to a variety of topics within the 3 disciplines of chemistry; however, it is imbedded within this curriculum that these topics can be linked back to those core fundamentals. Students are given regular opportunity to undertake practical investigations and critical analysis of data as a form of scientific enquiry. The curriculum prepares students for success should they wish to pursue further education on the chemical sciences, whilst simultaneously giving them strong transferrable skills should they wish to study an alternative discipline.

Half Term 1:	Subject specific skills being developed:	Half Term 2:	Subject specific skills being developed:	Half Term 3:	Subject specific skills being developed:
<p><b>All pupils will know:</b> The topic of Acids and Bases within the Physical Chemistry section of the course. The topic of Properties of Period 3 elements and their oxides within the Inorganic Chemistry section of the course. The topics of Aldehydes and Ketones, and Carboxylic acids and derivatives within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification <a href="https://www.aqa.org.uk/subjects/chemistry/AS-and-A-level/AS-and-A-level-Chemistry-Specification-Specifications-for-first-teaching-in-2015">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed by:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact- Why do we teach this?</b> Acids and base reactions form the basis of a variety of key reaction pathways in life, both physiological and non-physiological.</p> <p>Understanding the reactivity of Period 3 and the oxides that they form allows an in-depth understanding of how and why these reactions occur, and also consolidation of previous topics such as Acids and Bases and Periodicity.</p> <p>Carbonyl compounds are an important sub-group of organic molecules and understanding their reactivity enables students to understand fundamentals in reaction mechanisms. Organic chemistry is important in understanding the fundamentals of synthetic chemistry and how carbon containing compounds, which</p>	<ul style="list-style-type: none"> <li>● Reading Skills</li> <li>● Data Analysis</li> <li>● Vocabulary Skills when referring to subject-specific terminology.</li> <li>● Investigative Skills.</li> <li>● How science works</li> <li>● STEM</li> </ul>	<p><b>All pupils will know:</b> The topics of Equilibrium Constant <math>K_p</math> for homogenous systems and Thermodynamics within the Physical Chemistry section of the course. The topics of Aromatic chemistry and Amines within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification <a href="https://www.aqa.org.uk/subjects/chemistry/AS-and-A-level/AS-and-A-level-Chemistry-Specification-Specifications-for-first-teaching-in-2015">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact - Why do we teach this?</b> Equilibria and Thermodynamics are core concepts to understand when considering the feasibility and speed of chemical reactions.</p> <p>Aromatic rings and Amines are an important sub-group of organic molecules and understanding their reactivity enables students to understand fundamentals in reaction mechanisms. Organic chemistry is important in understanding the fundamentals of synthetic chemistry and how carbon containing compounds, which are an important group of chemicals with wide-ranging applications, can be designed.</p>	<ul style="list-style-type: none"> <li>● Reading Skills</li> <li>● Data Analysis</li> <li>● Vocabulary Skills when referring to subject-specific terminology.</li> <li>● Investigative Skills.</li> <li>● How science works</li> <li>● STEM</li> </ul>	<p><b>All pupils will know:</b> The topic of Electrode potentials and electrochemical cells within the Physical Chemistry section of the course. The topic of Reactions of ions in aqueous solution within the Inorganic Chemistry section of the course. The topics of Polymers and Amino acids, proteins, and DNA within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification <a href="https://www.aqa.org.uk/subjects/chemistry/AS-and-A-level/AS-and-A-level-Chemistry-Specification-Specifications-for-first-teaching-in-2015">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact - Why do we teach this?</b> Electrode potentials and electrochemical cells give students an understanding of how concepts such as reduction and oxidation can be applied to broad commercial applications. These range from small-scale such as powering mobile phones to larger scale such as providing energy to power a vehicle.</p> <p>Reactions of aqueous ions are an important part of understanding the chemical properties of transition metals.</p> <p>Polymers are an important sub-group of organic molecules and understanding their reactivity enables students to understand fundamentals in reaction mechanisms. Organic chemistry is important in understanding the fundamentals of synthetic chemistry and how carbon containing compounds, which are an important group of chemicals with wide-ranging applications, can be designed.</p> <p>Amino acids, proteins and DNA are the molecules of life and studying them in a chemical context enables</p>	<ul style="list-style-type: none"> <li>● Reading Skills</li> <li>● Data Analysis</li> <li>● Vocabulary Skills when referring to subject-specific terminology.</li> <li>● Investigative Skills.</li> <li>● How science works</li> <li>● STEM</li> </ul>
	<p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> pH, Ionic Product of Water, Dissociation Constant, Titration, Indicator, Buffer, Aldehydes, Ketones, Oxidation, Reduction, Nucleophilic Addition, Carboxylic Acids, Esters, Biodiesel, Nucleophilic Addition-Elimination, Acylation</p>		<p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> <math>K_p</math>, Mole Fraction, Homogenous, Equilibrium, Catalyst, Lattice Enthalpy, Born-Haber Cycles, Gibbs Free-Energy, Enthalpy, Entropy, Aromaticity, Electrophilic Substitution, Amines, Nucleophilic Substitution</p>	<p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> Half-equations, Electrode Potentials, Electrochemical Series, EMF, Current, Condensation Polymers, Biodegradability, Amino Acids, Zwitterions, Peptide Links, Hydrogen Bonding, Enzymes, Cisplatin</p>	
	<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>● Algebra</li> <li>● Handling data</li> <li>● Graphs</li> <li>● Discussing ethics in the context of the</li> </ul>		<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>● Algebra</li> <li>● Handling data</li> <li>● Graphs</li> <li>● Reporting values to appropriate</li> </ul>	<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>● Reporting values to appropriate significant figures</li> <li>● Handling data</li> </ul>	

<p>are an important group of chemicals with wide-ranging applications, can be designed.</p>	<p>decision making on the use and production of biofuel.</p>		<p>significant figures</p>	<p>students to understand their structure, bonding and how they interact with each other.</p>	<ul style="list-style-type: none"> <li>• Graphs</li> <li>• Taking into account society's need to assess the benefits and adverse effects of drugs.</li> </ul>
<p><b>Half Term 4:</b></p> <p><b>All pupils will know:</b> The topics of Reactions of ions in aqueous solution and Transition metals within the Inorganic Chemistry section of the course. The topics of Organic synthesis, Nuclear magnetic resonance spectroscopy and Chromatography within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification <a href="http://www.aqa.org.uk">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact - Why do we teach this?</b> Reactions of aqueous ions are an important part of understanding the chemical properties of transition metals, and we continue to examine these elements within the Transition metal section. Transition metals have important applications in catalysis and construction materials, amongst other applications.</p> <p>Organic synthesis is important in understanding how carbon containing compounds, which are an important group of chemicals with wide-ranging applications, can be designed.</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>• Reading Skills</li> <li>• Data Analysis</li> <li>• Vocabulary Skills when referring to subject-specific terminology.</li> <li>• Investigative Skills.</li> <li>• How science works</li> <li>• STEM</li> </ul> <p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> Amphoteric Character, Co-ordination, Ligand, Complex, Substitution Reaction, Monodentate, Bidentate, Multidentate, Chelate Effect, Cisplatin, Variable Oxidation State, Redox Potential, Heterogenous Catalysis, Atom Economy, NMR, Spectra, Chemical Shift, TMS, Thin-layer Chromatography, Column Chromatography,</p>	<p><b>Half Term 5:</b></p> <p><b>All pupils will know:</b> The topic Chromatography within the Organic Chemistry Section of the course. The remainder of the time will be revision of topics learnt throughout the course. This will be as outlined by the AQA Chemistry specification <a href="http://www.aqa.org.uk">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact - Why do we teach this?</b> Chromatography is an important tool in reaction analysis, and this allows pupils to develop problem-solving skills when evidencing the formation of an chemical substances. It also gives them an appreciation techniques used to analyse substances.</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>• Reading Skills</li> <li>• Data Analysis</li> <li>• Vocabulary Skills when referring to subject-specific terminology.</li> <li>• Investigative Skills.</li> <li>• How science works</li> <li>• STEM</li> </ul> <p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> , Thin-layer Chromatography, Column Chromatography, Gas Chromatography, Retention Times, R<sub>f</sub> Values and other key terms that they have studied throughout the course.</p>	<p><b>Half Term 6:</b></p> <p><b>All pupils will know:</b> Revision of the topics studied within the AQA Chemistry specification <a href="http://www.aqa.org.uk">AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</a></p> <p><b>All pupils will be assessed:</b> By short recall activities, electronic automatically marked homework's and longer answer short tests focussed on the topics. There will also be a longer exam as part of the data gathering for the whole year group twice a year. During lessons, regular use of AfL to assess understanding of the learning objectives.</p> <p><b>Impact- Why do we teach this?</b> Revision of topics taught within the AQA Chemistry Specification in preparation for students' examinations.</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>• Reading Skills</li> <li>• Data Analysis</li> <li>• Vocabulary Skills when referring to subject-specific terminology.</li> <li>• Investigative Skills.</li> <li>• How science works</li> <li>• STEM</li> </ul> <p><b>Reading Skills needed for this unit:</b> Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p><b>Key Vocabulary:</b> Key terms that they have studied throughout the course.</p>

<p>NMR and Chromatography are important tool in reaction analysis, and this allows pupils to develop problem-solving skills when evidencing the formation of an chemical substances. It also gives them an appreciation techniques used to analyse substances.</p>	<p>Gas Chromatography, Retention Times, R<sub>f</sub> Values</p>				
	<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>• Reporting values to appropriate significant figures</li> <li>• Handling data and data analysis</li> <li>• Graphs</li> </ul>		<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>• Reporting values to appropriate significant figures</li> <li>• Algebra</li> <li>• Geometry and Trigonometry</li> <li>• Handling data</li> <li>• Graphs</li> </ul>		<p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>• Reporting values to appropriate significant figures</li> <li>• Handling data</li> <li>• Graphs</li> </ul>
<p><b>Ensuring this curriculum meets the needs of all pupils:</b> this curriculum has been designed to ensure pupils from all starting points will develop the key curriculum skills and knowledge identified. The curriculum design ensures that each unit forms part of the overall learning journey and there are opportunities for revisiting skills and linking together key pieces of knowledge. Whole Academy policies and practices are followed to tailor the delivery of the curriculum for individuals and groups of students. For example SEND students have individual learning profiles that outline needs/strategies to be used, Whole group RIPs are in place to identify key teaching strategies that will be used with individual teaching groups. Ongoing formative assessment and clear summative assessment points allow individual staff and departments to identify misconception and adjust curriculum appropriately.</p>					
<p><b>Enrichment opportunities:</b></p> <ul style="list-style-type: none"> <li>• Pupils can attend after school talks delivered by academics on their research, which allows them to gain an appreciation for the wider applications of chemistry.</li> <li>• Students are educated on real-time chemical advancements, for example the work of the 2022 Chemistry Nobel Prize Winners.</li> <li>• Within lessons, strong links are fostered between the taught curriculum and how it links to real-life applications of that chemical concept.</li> </ul>					
<p><b>Career opportunities/ links:</b></p> <ul style="list-style-type: none"> <li>• Mock MMI (Multi Mini Interviews) offered to medicine applicants.</li> </ul>					