

2022-2023 Year 12 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>All pupils will know: The topic of Atomic Structure, Amount of Substance and Bonding within the Physical Chemistry section of the course. The topic of Periodicity within the Inorganic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification (aqa.org.uk)</p> <p>All pupils will be assessed by: 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>Impact- Why do we teach this? Within the Atomic Structure topic, students learn about the fundamental subatomic particles. Understanding their behaviour is crucial as it underpins core chemical concepts which they study as they progress through the course.</p> <p>Students the build upon this knowledge during the Bonding topic, where they begin to look at how the behaviour of these subatomic particles influences the relationships that different atoms have with each other.</p> <p>Periodicity relates to study of the periodic table and how its organisation of chemical elements gives chemists a sense of their</p>	<ul style="list-style-type: none"> ● Reading Skills ● Data Analysis ● Vocabulary Skills when referring to subject-specific terminology. ● Investigative Skills. ● How science works ● STEM 	<p>All pupils will know: The topic of Amount of Substance, Bonding, Oxidation and Reduction within the Physical Chemistry section of the course. The topic of Group 2, the alkaline earth metals and Group 7 (17), the halogens within the Inorganic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</p> <p>All pupils will be assessed: 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>Impact - Why do we teach this? In this term, students build upon their knowledge of quantitative analysis in the Amount of Substance Topic to evaluate the success of chemical investigations through learning about uncertainty, errors and yield.</p> <p>Oxidation and Reduction are important reactions that link in with multiple future topics, so a solid foundation is key to understand these future topics.</p> <p>Learning about Bonding allows students to relate the properties of materials to the behaviour of the particles that form them.</p> <p>Learning about Group 2 and Group 7 allows students to apply and consolidate their knowledge</p>	<ul style="list-style-type: none"> ● Reading Skills ● Data Analysis ● Vocabulary Skills when referring to subject-specific terminology. ● Investigative Skills. ● How science works ● STEM 	<p>All pupils will know: The topic of Energetics within the Physical Chemistry topic. The topic of Introduction to organic chemistry and Alkanes within the Organic Chemistry topic. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</p> <p>All pupils will be assessed: 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>Impact - Why do we teach this? Energetics allows students to calculate how heat changes in chemical reactions, which gives us important information about the reactants and products involved.</p> <p>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"> ● Reading Skills ● Data Analysis ● Vocabulary Skills when referring to subject-specific terminology. ● Investigative Skills. ● How science works ● STEM
	<p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: Protons, Neutrons, Electrons, Mass Spectroscopy, Ionisation, Isotopes, VSEPR, Electronegativity, Polarity, Forces, Solubility, Halogen, Oxidising Ability, Relative Atomic Mass, Relative Molecular Mass, Avogadro's Number, Mole, Concentration, Redox, Empirical and Molecular Formula,</p>		<p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: Oxidising Ability, Yield, Atom Economy, Uncertainty, Error, Solubility, Reducing Ability, Oxidising Ability</p>		<p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: Endothermic, Exothermic, Enthalpy, Calorimetry, Hess' Law Empirical Formula, Molecular Formula, General Formula, Structural Formula, Displayed Formula, Skeletal Formula, IUPAC, Free-radical, Isomerism, Alkanes, Fractional Distillation, Cracking, Combustion, Chlorination</p>

<p>physical and chemical properties. The historical development of the Periodic Table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time.</p> <p>Studying Amount of Substance gives students the key mathematical skills that they require for quantitative analysis during practical investigations.</p>	<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> Algebra Geometry and Trigonometry Handling data Graphs Evaluating large scale industrial chemistry from an economic and environmental perspective. 	<p>of periodicity to 2 different groups within the periodic table that have contrasting chemical properties.</p>	<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> Algebra Handling data Graphs Relating specific chemicals to their use in the agricultural industry (Group 2). 		<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> Reporting values to appropriate significant figures Handling data Graphs
<p>Half Term 4:</p> <p>All pupils will know: The topic of Kinetics and Chemical equilibria, Le Chatelier's Principle and K_c in the Physical Chemistry section of the course. The topic of Halogenoalkanes and Alkenes within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</p> <p>All pupils will be assessed: 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>Impact - Why do we teach this? Kinetics and Chemical equilibria give us an understanding of the speed and direction of many chemical processes.</p>	<p>Subject specific skills being developed:</p> <ul style="list-style-type: none"> Reading Skills Data Analysis Vocabulary Skills when referring to subject-specific terminology. Investigative Skills. How science works STEM <p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: Activation Energy, Reaction Rate, Collision Frequency, Catalysts, Le Chatelier's Principle, Equilibria, K_c</p>	<p>Half Term 5:</p> <p>All pupils will know: The topic of Rate Equations within the Physical Chemistry section of the course. The topic of Alcohols and Organic analysis within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</p> <p>All pupils will be assessed: 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>Impact - Why do we teach this? Understanding reaction rates and the factors influencing them give us an understanding of chemical reactions and processes.</p> <p>Organic chemistry is important in understanding the fundamentals of synthetic chemistry and how carbon containing compounds, which are an</p>	<p>Subject specific skills being developed:</p> <ul style="list-style-type: none"> Reading Skills Data Analysis Vocabulary Skills when referring to subject-specific terminology. Investigative Skills. How science works STEM <p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: Rate Constant, Hydration, Fermentation, Biofuel, Oxidation, Elimination, Mass Spectrometry, Infrared Spectroscopy</p>	<p>Half Term 6:</p> <p>All pupils will know: The topic of Acids and Bases within the Physical Chemistry section of the course. The topic of Optical Isomerism within the Organic Chemistry section of the course. This will be as outlined by the AQA Chemistry specification AS and A-level Chemistry Specification Specifications for first teaching in 2015 (aqa.org.uk)</p> <p>All pupils will be assessed: 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>Impact- Why do we teach this? Acids and base reactions form the basis of a variety of key reaction pathways in life, both physiological and non-physiological.</p> <p>Optical isomerism is a chemical concept that has wide ranging applications, notably within the pharmaceutical industry. The study of optical isomerism can also be linked to appreciating one of</p>	<p>Subject specific skills being developed:</p> <ul style="list-style-type: none"> Reading Skills Data Analysis Vocabulary Skills when referring to subject-specific terminology. Investigative Skills. How science works STEM <p>Reading Skills needed for this unit: Critical Evaluation of journals, data, texts. Ability to read and follow a method in the context of a chemical investigation.</p> <p>Key Vocabulary: pH, Ionic Product of Water, Dissociation Constant, Titration, Indicator, Buffer, Stereoisomerism, Chirality, Enantiomer, Racemic</p>

<p>Halogenoalkanes and Alkenes are important organic molecules and understanding their chemistry is key for understanding the fundamentals of synthetic chemistry.</p>	<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> • Reporting values to appropriate significant figures • Handling data and data analysis 	<p>important group of chemicals with wide-ranging applications, can be designed.</p> <p>Organic analysis allows pupils to develop problem-solving skills when relating them evidencing the formation of an organic substance. It also gives them an appreciation of the spectroscopic and spectrometric techniques used to analyse substances.</p>	<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> • Algebra • Geometry and Trigonometry • Handling data • Graphs • Discussing ethics in the context of the decision making on the use and production of biofuel. 	<p>the many facets of the drug discovery process, which students encounter upon discussion of Thalidomide.</p>	<p>Opportunity for cross-curricular skill development</p> <ul style="list-style-type: none"> • Reporting values to appropriate significant figures • Handling data • Graphs
<p>Ensuring this curriculum meets the needs of all pupils: 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>Enrichment opportunities:</p> <ul style="list-style-type: none"> • 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. • Students are educated on real-time chemical advancements, for example the work of the 2022 Chemistry Nobel Prize Winners. • Within lessons, strong links are fostered between the taught curriculum and how it links to real-life applications of that chemical concept. 					
<p>Career opportunities/ links:</p> <ul style="list-style-type: none"> • Promotion of careers within the health care sector through making pupils aware of online work experience organised by the NHS and supporting their applications. 					