



Learning Aims and Curriculum Intent:

In year 12 Chemistry, students will build on the knowledge and skills that they have learnt at GCSE level. They will develop essential knowledge and understanding of different areas of the subject and how they relate to each other and allow students to develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods. Students will develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject and understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society. They will begin to make links between the discrete topics studied in Inorganic, Organic and Physical Chemistry, and appreciate how they interconnect with each other.

Term	Content, Key Questions and Knowledge	Skills	Assessment	
Michaelmas	<p>Amount of Substance In this topic, important fundamental chemical skills are developed: writing chemical formulae, constructing equations and calculating chemical quantities using the concept of amount of substance. This includes mole calculations in solids, solutions and gases, as well as calculating reacting masses, empirical formula and water of crystallisation.</p> <p>Acids, Redox and Titrations The role of acids bases and salts in chemistry is developed in the context of neutralisation reactions. Student will be expected to recall common acids, bases and be able to identify salts. They will also be able to explain the differences between strong and weak acids and bases. They will be introduced to the techniques and procedures used when preparing a standard solution of required concentration and carrying out acid–base titrations, as well as carrying out the related calculations. Redox reactions are studied within the context of oxidation number and electron transfer.</p>	<p>Atomic Structure This section builds directly from GCSE Science, starting with basic atomic structure and isotopes. Students will be introduced to the concept of relative isotopic mass and how this is determined using mass spectrometry. Students will then be introduced to the concept of atomic orbitals and develop a deeper understanding of electron configurations linked to the periodic table.</p> <p>Bonding, Shapes and Electronegativity The central role of electrons in ionic and covalent bonding is then studied. The important role of molecules is studied, including an explanation of polarity and intermolecular forces, and how these depend upon electronegativity. Finally, this section looks at how bonding and structure contribute to properties of substances, including ionic, simple covalent, giant covalent and metallic bonding.</p> <p>Periodicity Periodic trends are studied to extend the understanding of structure and bonding, including trends in first ionisation energy, successive ionisation energy and melting points.</p>	<p>Planning Experimental design, including to solve problems set in a practical context. Identification of variables that must be controlled, where appropriate Evaluation that an experimental method is appropriate to meet the expected outcomes.</p> <p>Implementing How to use a wide range of practical apparatus and techniques correctly Appropriate units for measurements Presenting observations and data in an appropriate format.</p> <p>Analysis Processing, analysing and interpreting qualitative and quantitative experimental results. Use of appropriate mathematical skills for analysis of quantitative data Appropriate use of significant figure Plotting and interpreting suitable graphs from experimental results, including: (i) selection and labelling of axes with appropriate scales, quantities, and units (ii) measurement of gradients and intercepts.</p>	<p>Each topic contains a 40-minute End of Topic Assessment. Some longer topics also have half-way assessments.</p> <p>PAG 1 Mole Determination PAG 2 Acid-Base Titration</p>
Lent	<p>Enthalpy Students learn about the importance of enthalpy changes, their uses and determination from experimental results including enthalpy cycles. They will also determine enthalpy changes using secondary data e.g., bond enthalpy values.</p> <p>Group 2 and Group 7 Group properties are studied using Group 2 and the halogens as typical metal and non-metal groups respectively, allowing an understanding of redox reactions to be developed further. Physical properties, such as melting point and solubility, as well as chemical properties such as reactivity will be studied. Students will also be introduced to relative reactivities in the form of halogen displacement reactions. Students will carry out qualitative analysis of ions on a test-tube scale and will become familiar with the processes and techniques needed to identify ions in an unknown compound.</p> <p>Kinetics Students will investigate the ways in which a change in conditions can affect the rate of a chemical reaction, in terms of activation energy, the Boltzmann distribution and catalysis.</p>	<p>Alkanes and Alkenes Introduces the various types of structures used routinely in organic chemistry, nomenclature, and the important concepts of homologous series, functional groups, isomerism, and reaction mechanisms using curly arrows. The initial ideas are then developed within the context of the hydrocarbons: alkanes and alkenes, including their physical and chemical properties, and their common reactions. Students will also be introduced to the concept of isomerism, including chain isomerism and E/Z isomerism.</p> <p>Analytical Techniques The important techniques of infrared spectroscopy and mass spectrometry are used to illustrate instrumental analysis as a valuable tool for identifying organic compounds.</p> <p>Alcohols and Alkyl Halides Students are introduced to two further functional groups: alcohols and haloalkanes and consider the importance of polarity and bond enthalpy to organic reactions.</p>	<p>Evaluation How to evaluate results and draw conclusions Identification of anomalies in experimental measurements Identifying the limitations in experimental procedures Precision and accuracy of measurements and data, including margins of error, percentage errors and uncertainties in apparatus. Refining experimental design by suggestion of improvements to the procedures and apparatus.</p> <p>Independent Thinking Apply investigative approaches and methods to practical work.</p> <p>Use and application of scientific methods and practices</p>	<p>Each topic contains a 40-minute End of Topic Assessment. Some longer topics also have half-way assessments.</p> <p>PAG 3 Enthalpy Changes PAG 4 ID Unknown Inorganics PAG 9 Continuous Rates</p>

Trinity	<p>Equilibrium Reversible reactions are studied, including the dynamic nature of chemical equilibrium and the influence of conditions upon the position of equilibrium. Finally, the integrated roles of enthalpy changes, rates, catalysts and equilibria are considered as a way of increasing yield and reducing energy demand, improving the sustainability of industrial processes.</p> <p>Kc and Kp Students will learn expressions for the equilibrium constant, Kc, for homogeneous reactions and calculations of the equilibrium constant, Kc, from provided equilibrium concentrations, and will be able to estimate of the position of equilibrium from the magnitude of Kc.</p>	<p>NMR and Chromatography This section demonstrates how analytical techniques, such as infrared spectroscopy, mass spectrometry and elemental analysis may be used in combination with NMR spectroscopy to provide evidence of structural features in molecules. The instrumentation methods of analysis studied here will provide students with an important base of knowledge, understanding and awareness for further study in Higher Education and in many areas of employment in the broad scientific field.</p> <p>Synthesis Throughout this section, there are many opportunities for developing organic practical skills, including preparation and purification of organic liquids.</p>	<p>Safely and correctly use a range of practical equipment and materials, including identification of potential hazards and understanding how to minimise the risks involved. Follow written instructions Make and record observations/ measurements Keep appropriate records of experimental activities Present information and data in a scientific way Use appropriate software and tools to process data, carry out research and report findings</p> <p>Research and referencing Use online and offline research skills including websites, textbooks and other printed scientific sources of information Correctly cite sources of information</p> <p>Instruments and equipment Use a wide range of experimental and practical instruments, equipment and techniques appropriate to the knowledge and understanding included in the specification.</p>	<p>Each topic contains a 40 minute End of Topic Assessment. Some longer topics also have half-way assessments.</p> <p>PAG 5 Synthesis of Organic Liquid PAG 7 Organic molecules inc Spectroscopy</p>

Examples of Homework	Students are expected to undertake regular independent consolidation of material. They may also be set research work, consolidation exercises, past exam question practice, practical preparation tasks and other activities.	
Key terminology	Module 2 Module 3 Module 4	
Super-curricular enrichment and scholarly extension	<p>Read: "The Disappearing Spoon" by Sam Kean: A fascinating book that explores the periodic table and the stories behind the elements. "The Immortal Life of Henrietta Lacks" by Rebecca Skloot: A gripping true story about the impact of cell culture on medical research, with a focus on the immortal cells of Henrietta Lacks. "Napoleon's Buttons: How 17 Molecules Changed History" by Penny Le Couteur and Jay Burreson: An intriguing book that delves into the chemistry behind key historical events and discoveries.</p> <p>Watch: Chemistry - YouTube.</p> <p>Listen: "Stuff You Should Know" podcast: A popular podcast that covers a wide range of fascinating topics, including episodes on chemistry and scientific discoveries. "Chemistry World Podcast": Produced by the Royal Society of Chemistry, this podcast provides insights into the latest developments and research in the field of chemistry. "The Infinite Monkey Cage" podcast: Hosted by physicist Brian Cox and comedian Robin Ince, this entertaining podcast explores various scientific concepts, including chemistry, in a humorous and informative way.</p> <p>Visit: The Science Museum: Located in South Kensington, the Science Museum offers a range of exhibits and interactive displays covering various scientific disciplines, including chemistry. The Wellcome Collection: A museum and library exploring the connections between science, medicine, and art. They often have thought-provoking exhibitions related to chemistry and other scientific topics. The Royal Society of Chemistry: Visit their headquarters in Burlington House to explore their collections, attend lectures or events, and learn more about the world of chemistry.</p>	
Useful websites	chemguide: helping you to understand Chemistry - Main Menu , 2. OCR Revision Guides chemrevise , legacy OCR Chemistry A - A-Level Chemistry , Introducing Isaac Chemistry Resources – Isaac Physics , A-Level Digest: Chemistry (aleveldigest.blogspot.com) , sci (knockhardy.org.uk) Past Paper Resource: Chemistry Revision - PMT (physicsandmathstutor.com)	
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	Teachers	