Curriculum Map
Year 13

Chemistry

Learning Aims and Curriculum Intent:

In year 13 Chemistry, students will build on the knowledge and skills that they have learnt in year 12. 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. In Inorganic/Physical Chemistry the largely qualitative treatment of reaction rates and equilibria encountered in year 12 is developed within a quantitative and graphical context. In Organic Chemistry a greater emphasis will be placed on the importance of organic synthesis and the use of NMR spectroscopy and other instrumentation techniques used in organic and forensic analysis. Students will develop 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 continue 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	**Thermodynamics** Students will build upon the concepts studied in year 12 and will be introduced to Born–Haber cycles as a theoretical model to illustrate the energy changes associated with ionic bonding. Entropy and free energy are then introduced as concepts used to predict quantitatively the feasibility of chemical change. **Kinetics** In this topic, the largely qualitative treatment of reaction rates encountered in year 12 is developed within a quantitative and graphical context. Students will be introduced to the concepts of orders of reaction, the reaction constant and reaction mechanisms. They will also be able to manipulate the Arrenhius equation and link this to graphical representations of reaction rates. **Acids, Bases, and Buffers** In this topic, the largely qualitative treatment of acids and bases encountered in year 12 is developed within a quantitative and graphical context. Students will be able to calculate the pH of both strong acids and bases, as well as the pH of weak acids. They will also understand what is meant by a buffer solution, how to calculate its pH and explain the control of blood pH by the carbonic acid–hydrogencarbonate buffer system. They will also be able to understand and interpret pH curves and be able to select an appropriate indicator for a given titration.	**Carbonyl Chemistry** In year 12 students, studied alkanes, alkenes, alcohols, and halogenoalkanes. Students will now be introduced to further important carbonyl compounds, aldehydes, and ketones, and will study their chemical reactions including oxidation and nucleophilic addition. They will also learn the characteristic tests for carbonyl compounds. **Carboxylic Acids and Derivatives** In this topic, carboxylic acids and their related functional groups, acyl chlorides and esters, are studied. Including their properties and key chemical reactions. The importance of acyl chlorides in organic synthesis is emphasised. **Aromatic** Aromatic compounds are introduced, including the central role of delocalisation within the chemistry of arenes and phenols. Directing groups are also introduced, including their importance to organic synthesis.	**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. **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. **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. **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. **Independent Thinking** Apply investigative approaches and methods to practical work **Use and application of scientific methods and practices** 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	Each topic contains a 40-minute End of Topic Assessment. Some longer topics also have half-way assessments. PAG 6 Synthesis of organic solid PAG 10 Initial Rates PAG 11 Acids Bases pH Buffers and Indicators
Lent	**Redox Titration and Electrode Potentials** Redox chemistry permeates chemistry and the introductory work in year 12 is developed further within this topic, including use of volumetric analysis for redox titrations and an introduction of electrochemistry in the context of electrode potentials. Students will apply this in the context of fuel cells. **Transition Metals** Learners will develop a deeper knowledge and understanding of the periodic table within the context of the transition elements. This includes the role of ligands in complex ions, stereochemistry, precipitation, ligand substitution and redox reactions. The colour changes and observations in these reactions will increase students' toolkit of qualitative inorganic tests for identifying unknown ionic compounds.	**Amines and Amino Acids** Students will focus on organic nitrogen compounds, including amines, amides, and amino acids. This will include the basicity and preparation of amines, reactions of amino acids and stereochemistry of amides. Chirality and optical isomerism are also introduced. **Polyesters and Polyamides** Condensation polymerisation of both polyesters and polyamides is introduced and compared with addition polymerisation. **Organic Synthesis** The importance of carbon–carbon bond formation in organic synthesis is stressed, exemplified by the formation nitriles from haloalkanes, and their subsequent reaction to form amines or carboxylic acids. At this point in the course students are expected to be able to consider multi-stage synthetic routes towards an organic product. This module allows learners many opportunities to further develop their organic practical skills, especially in preparing and purifying organic solids, including recrystallisation and determination of melting points.		Each topic contains a 40 minute End of Topic Assessment. Some longer topics also have half-way assessments. PAG 8 Redox Equilbiria and Electrode Potentials PAG 12 Redox Titration and Rates Independent

Trinity	**Exam Preparation**	Use appropriate software and tools to process data, carry out research and report findings **Research and referencing** Use online and offline research skills including websites, textbooks and other printed scientific sources of information Correctly cite sources of information **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.	

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. As we progress towards the end of the year, students will be expected to simulate an A level exam by practising whole past papers.	
Key terminology	Module 2 Module 3 Module 4 Module 5 Module 6	
Super-curricular enrichment and scholarly extension	**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. **Watch:** Chemistry - YouTube, **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. **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.	
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	