A2 CHEMISTRY

Year 13

What are the aims and intentions of this curriculum?

The aim of our Key Stage 5 Curriculum is to promote a passion for chemistry and equip the students with the necessary skills and qualifications for the next step towards their future career. The curriculum will deliver the A level subject content through the Modules: Physical chemistry and transition elements and Organic chemistry and analysis. This is a flexible approach where each module is divided into topics that cover the key concepts of chemistry. The teaching of practical skills is integrated within the theoretical topics. As well as developing strong mathematical ability, this curriculum will provide our students with invaluable and transferable skills including: analysis and problem solving, time management and organisation, as well as written and oral communication skills.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	• Equilibrium • Aromatic chemistry • Carbonyls and carboxylic acids	Students will continue to build on their knowledge and understanding of the chemical concepts that were developed in AS Chemistry. The largely qualitative treatment of equilibria encountered in AS Chemistry is further developed within a quantitative content. This section also allows students to develop practical quantitative techniques involved in the determination of chemical equilibria. Students will learn of the extended range of functional groups within organic chemistry. Aromatic compounds are first introduced, including the central role of delocalization within the chemistry of arenes and phenols. Directing groups are also introduced, including their importance to organic synthesis. The important carbonyl compounds, aldehydes and ketones are then studied. Carboxylic acids and their related functional groups, acyl chlorides and esters are also studied. The importance of acyl chlorides in organic synthesis is emphasized.	The development of mathematical skills, including the use of logarithms and exponents when studying the content and when carrying out quantitative practical work. The further development of important organic practical skills, including the use of Quickfit apparatus for distillation and heating under reflux.	• PAG 9: Rates of reaction – continuous monitoring. • PAG 10: Rates of Reaction – initial rate method. • Equilibrium assessment. • Aromatic chemistry assessment. • Carbonyls and carboxylic acids assessment.

Autumn 2	• Acids, bases and pH • Buffers and neutralisation • Amines, amino acids and polymers	Students will develop practical quantitative techniques involved in the determination of pH. Students will learn the concept of acid-base equilibria including pH, Ka and buffer solutions. Important organic nitrogen compounds, including amines, amides and amino acids are studied. Chirality and optical isomerism is also introduced. Condensation polymerisation is covered and is compared with addition polymerisation.	There are opportunities for developing mathematical skills when studying pH and when carrying out quantitative practical work. The development of important qualitative practical skills, especially observational skills required for the determination of organic substances from test tube tests.	• PAG 11: pH Measurement. • Acids, bases and pH assessment. • Buffers and neutralisation assessment. • Amines, amino acids and polymers assessment. • First Trial Examination.
Spring 1	• Enthalpy and entropy • Redox and electrode potentials • Organic synthesis	Born-Haber cycles are used 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. Redox chemistry is developed further in this section, including the use of volumetric analysis for redox titrations and an introduction of electrochemistry in the context of electrode potentials.	There are opportunities for developing mathematical skills when studying enthalpy changes and determining entropy. Quantitative techniques are further developed in the implementation of redox titrations. The further development of important organic practical skills, especially in preparing and purifying organic solids, including recrystalisation and determination of melting points.	• PAG 6: Synthesis of organic compound • PAG 8: Electrochemistry • Enthalpy and entropy assessment • Redox and electrode potentials assessment • Organic synthesis assessment

Spring 2	• Transition elements • Chromatography and spectroscopy	This section provides students with a deeper knowledge and understanding of the periodic table within the context of the transition elements. Students will learn the role of ligands in complex ions, stereochemistry, precipitation, ligand substitution and redox reactions. The colour changes and observations in these reactions allow the use of qualitative inorganic tests for identifying unknown ionic compounds. This section demonstrates how the analytical techniques covered in AS chemistry may be used in combination with NMR spectroscopy to provide evidence of structural features in molecules. Students will also look at how unknown organic functional groups can be analysed and identified using simple test tube tests.	The development of important qualitative practical skills, especially observational skills required for inorganic and organic analysis. The development of analytical skills from the use of chromatography and NMR spectroscopy.	• PAG 7: Identifying unknown organic compounds • PAG 12: Research Skills. • Transition elements assessment • Chromatography and spectroscopy assessment • Second Trial Examination
Summer 1	• Revision	The consolidation and practice of the subject content contained in the AS modules: Foundations in chemistry, Periodic table and energy and Core organic chemistry, and the A2 modules: Physical chemistry and transition elements and Organic chemistry and analysis, through revision lessons, completing past paper questions, timed questions, student presentations and online quizzes.	The consolidation of mathematical skills, practical skills and analytical skills acquired through the two years.	