A Level Chemistry – L6

Curriculum Intent

Chemistry is the study of matter, its properties, how and why substances combine or separate to form other substances, and how substances interact with energy. The A level Chemistry course provides an interesting and challenging experience to link key chemical ideas and understand how they relate to each other.

The course aims for all students to: ·

- develop essential knowledge, understanding and application of different areas of the subject and how they relate to each other
- understand how society makes decisions about scientific issues and how Chemistry contributes to the success of the economy and society
- develop competence and confidence in a variety of practical, mathematical, and problem-solving skills
- develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods promote students' interest in and enthusiasm for the subject, including an interest in further study and careers associated with the subject.

"Every aspect of the world today -even politics and International relations – is affected by Chemistry" – Linus Pauling

Students will learn: - Autumn Term – Module 2 Foundations in Chemistry & Module 3.1 Periodic -Term 1

Atomic structure. Quantitative chemistry: Formulae, equations, amount of substance and the mole. Reactions of acids. Oxidation number and redox reactions. Bonding and structure. The periodic table.

Spring term – Module 3.2.1. Enthalpy, Module 4 Core organic chemistry and analysis – Term 2

Enthalpy. Basic concepts of organic chemistry. Aliphatic hydrocarbons. Alcohols and haloalkanes. Organic practical skills and organic synthesis. Instrumental analytical techniques.

Summer term Module 3.2.2-3 and 5.1.1. Reaction rates and equilibrium part 1. Module 6.1 Aromatic compounds and carbonyls – Term 3

Rates of reaction. Dynamic equilibrium. Aromatic chemistry. Carbonyl compounds and carboxylic acids.

What does excellence look like?

- Carrying out practical processes logically, precisely, and accurately.
- Linking ideas together to answer questions logically and sequenced.
- Linking big ideas to answer real life Chemistry problems. For example. Unstructured calculations in unfamiliar contexts. Linking ideas about redox with titration calculations. Explanation of structure, bonding and properties of aluminium chloride. Explanation of anomalous properties of beryllium and fluorine. Unstructured calculations in unfamiliar contexts. Linking ideas about bond enthalpy and stability of intermediates to rate of hydrolysis of haloalkanes. Explaining when and how to use Cahn-Ingold-Prelog rules to name complex alkenes.

Knowledge, understanding & Skills

Term 1: Atomic structure, isotopes, relative mass, formulae, and equations. Amount of substance and, the mole, determination of formulae, moles, and volumes, reacting quantities. Acids, bases and neutralisation, acid-base titrations. Oxidation number, redox reactions in terms of oxidation number and electron transfer, redox reactions of metals with acids, interpretation of familiar and unfamiliar redox reactions. Electron structure in terms of s-, p- and d-orbitals in subshells. Ionic bonding and structure; covalent bonding. Shapes of molecules and ions; electronegativity and polarity; intermolecular forces; hydrogen bonding. The periodic table, ionisation energies, periodic trends in bonding and structure. Periodicity: The periodic table, ionisation energies, periodic trends in bonding. Reactivity trends in groups 2 & 17, qualitative analysis

Term 2: Enthalpy changes, calorimetry, bond enthalpies. Types of carbon compounds, nomenclature, isomerism, representing carbon compounds, introduction to mechanism. Properties and reactions of alkanes, properties of alkenes, stereoisomerism, reactions of alkenes, electrophilic addition, addition polymerisation, processing waste polymers. Properties and reactions of alcohols, chemistry of the haloalkanes, organohalogen compounds in the environment. Practical techniques in organic chemistry, synthetic routes, functional group tests. Spectroscopy: mass spectroscopy, infrared spectroscopy, application to global warming and breathalysers.

Term 3: Reaction rates, effect of concentration and pressure, practical methods, rate from gradient of graph; catalysis; Boltzmann distribution. Orders, rate equations and rate constants; concentration-time graphs, rate-concentration graphs and initial rates. Rate-determining step, rate constants and temperature (Arrhenius equation). Dynamic equilibrium, le Chatelier's principle, equilibrium constant K_c part 1. Models for benzene, nomenclature, electrophilic substitution reactions of benzene, the chemistry of phenol, directing groups. Carbonyl compounds, nucleophilic addition reactions of aldehydes and ketones, identification of aldehydes and ketones. Properties and reactions of carboxylic acids; esterification and hydrolysis of esters; formation and use of acyl chlorides in synthesis.

What does excellence look like?

- Application of organic reactions and amount of substance calculations to select the optimum synthetic route of a pharmaceutical precursor.
- Identifying an unknown by linking spectroscopy and elemental analysis.
- Unstructured calculations in unfamiliar contexts.
- Proposing a justified reaction mechanism from empirical rate data.
- Mechanism of acylation of benzene.
- Prediction and justification of the formation of enantiomers following nucleophilic addition to aldehydes and ketones.

How will we assess impact?

- Peer, self and teacher assessment in lessons
- Previous lesson recap quiz
- Teacher questioning
- Landmark tasks
- End of Topic tests

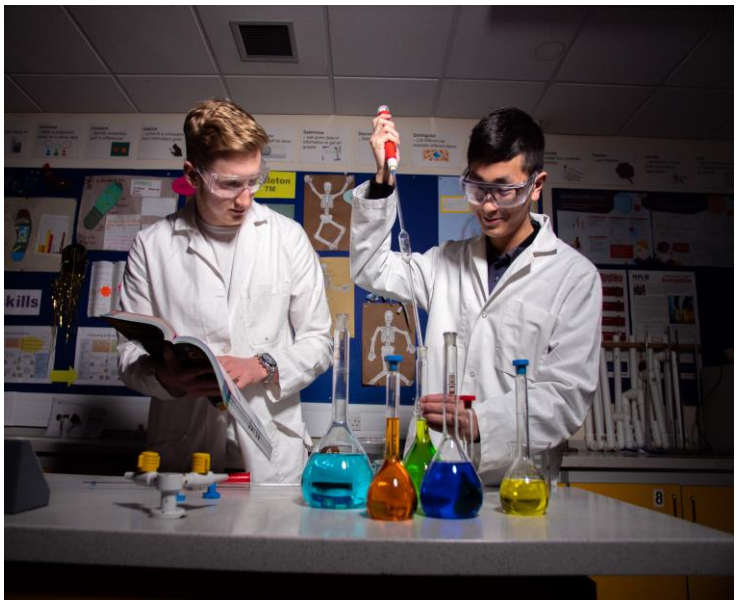
How can you enhance your learning at home?

- Kerboodle
- Chemguide
- Isaac chemistry
- Knockhardy
- Royal Society of Chemistry
- Physicsandmathstutor

Suggested homework tasks

- Learn definitions of key terms.
- Group and independent research projects
- Past examination questions practice

Practical activity preparation, simulations, and follow-up.



Entry requirements To study A level Chemistry students require grade 6 or above in GCSE Chemistry or 66 or above in Combined Science including at least 6 in Chemistry components. Grade 6 or above in GCSE Mathematics is also required.

International Opportunities

Visits Programme

- **Chemistry in Action lecture visit on international themes with globally renowned speakers**
- **International day across the school**

Within the curriculum

The Chemistry A Level curriculum is designed to deepen understanding and appreciation of how our international society makes decisions about world scientific issues. Students can compete in the International Chemistry Olympiad, Cambridge L6th Chemistry Challenge and Royal Society of Chemistry Schools' Analyst Competitions.

Students are encouraged to research each theme beyond lessons and set work to ensure that they can draw on worldwide knowledge of the skills, techniques and theoretical understanding required for the further study of Chemical Sciences at an International level.