IB Chemistry HL and SL

IB Chemistry aims to give students a challenging, interesting and enjoyable education in the subject at this level. The Higher Level course provides an essential foundation for a wide range of university courses, including medicine and the physical sciences, while the Standard Level course provides the useful chemical background to courses in biology, physics and geography, as well as being a worthwhile end in itself. The course is practically based with an emphasis on developing a good standard of investigative skills. The theoretical side of the course aims to develop the student's ability to understand the nature of matter. Using a logical approach and the application of mathematics, it is possible to predict and explain the behaviour of materials. The course is completed with an option topic that allows the student to develop their own interests and see how the subject has relevance to biological, environmental or industrial applications. As with all the sciences, chemists contribute to a combined 'Group 4 Project' in collaboration with those studying physics, biology and design technology.

Content

All students follow the core components of the course, along with one option topic. Those studying HL will look into the option and some other aspects of the core material in greater detail. The core comprises the following topics.

- Stoichiometric relationships – the relative numbers of atoms, molecules and ions in reactions
- Atomic structure – the inner structure of the atom
- Periodicity – patterns and explanations in the behaviour of the elements
- Chemical bonding and structure – the different way atoms and molecules attract each other
- Energetics/thermochemistry – heat changes and their explanation in terms of bonding
- Chemical kinetics – making reactions go faster; measuring their rates and mechanisms
- Equilibrium – reactions that go both ways and how to influence them
- Acids and bases – protons lost and gained and changes in pH
- Redox processes – electrons lost and gained and electrochemical cells
- Organic chemistry – an introduction to the vast variety of compounds based on carbon
- Measurement, data processing and analysis – uncertainties and instrumental techniques

The options available are:

Materials, Biochemistry, Energy, Medicinal chemistry.

Assessment

The course is examined through three written papers contributing a total of 80% of the final grade. The papers cover a range of multiple-choice, structured and extended response questions. The remaining 20% of the marks come from an individual practical investigation on a topic of the student's choice, carried out in the second year of the course.

Three written papers

Individual practical investigation

A Level Chemistry

Exam Board: OCR (Chemistry A)

The A Level course aims to give students a challenging, interesting and enjoyable education in the subject at this level. It provides an essential foundation for a wide range of university courses as well as giving a detailed scientific understanding of the nature of matter. The courses are practically based throughout. Assessment is at the end of the two year course through three written exam papers.

Module 1 Development of practical skills

This module underpins the whole of the course, and covers the practical skills that students should develop throughout the two years. The practical skills in this module can be assessed within the written examinations for any of the other modules, and also within the Practical Endorsement.

L6 Course Content

Module 2 Foundations in chemistry (assessed in all exam papers)

Some of the important ideas met at GCSE Science and GCSE Chemistry are reinforced and developed; including atomic structure, chemical bonding, quantitative calculations, acid-base and redox reactions. These ideas provide the essential foundation for all the further modules.

Module 3 Periodic table & energy (assessed in both AS Papers and A Level Paper 1 and 3)

This includes a study of the Periodic table, with a focus on Group 2 and Group 7, as well as qualitative analysis to identify unknown compounds. This is followed by the theory of why chemical reactions involve energy changes, how their rate can be affected, and how reactions reach equilibrium.

Module 4 Core organic chemistry (assessed in both AS Papers and A Level Paper 2 and 3)

This covers a detailed study of the organic chemistry of the hydrocarbons, alcohols and organic halogen compounds. This gives a framework for the synthesis of a range of organic compounds. The analytical techniques of infrared and mass spectrometry are also introduced at this stage.

U6 Course Content

Module 5 Physical Chemistry and transition elements (assessed in A Level Paper 1 and 3)

This module builds on the physical and inorganic chemistry covered in module 3 to give a more quantitative study of rates and reversible reactions, plus the detailed theory of acids, bases and pH. A study of electrochemistry and free energy is then applied in the context of the transition elements.

Module 6 Organic chemistry and analysis (assessed in A Level Paper 2 and 3)

This completes study of organic chemistry with the chemistry of the carboxylic acids and nitrogen compounds, leading to an understanding of condensation polymers. Further organic synthesis, as well as the use of chromatography with other modern instrumental methods of analysis are also covered.

Practical Endorsement

This component is common to all A Level chemistry courses. Students must demonstrate practical competence over the whole course through teacher-assessment of their practical work against a set of criteria covering the full range of practical skills . Performance is reported separately to the A Level grade on a pass/fail basis.