IBS 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 IB Standard Chemistry course provides stimulating opportunities to appreciate the study and creativity associated with chemistry within a global context.

The course aims for all students to: ·

- Acquire, apply and use knowledge, methods and techniques that characterise chemistry
- Develop an ability to analyse, evaluate and synthesise chemistry information
- Develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
- Appreciate the possibilities and limitations of chemistry while becoming critically aware, as global citizens, of the ethical implications of using chemistry
- Develop and understanding of the relationships between scientific disciplines and their influence on other areas of knowledge
  Promote students' interest in and enthusiasm for the subject.

"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we fear less" Marie Curie

Students will learn: - Autumn term – Term 1

Atomic structure and periodic table; Bonding, structure and properties; Organic structures; Energy from fuels.

Spring term – Term 2

Stoichiometric relationships "How much?"; Energetics

Summer term – Term 3

Kinetics "How fast?"; Equilibria "How far?". Group 4 Sciences collaborative research project.

What does excellence look like?

- Carrying out practical processes logically, precisely, and accurately.
- Linking ideas together to answer questions logically and sequenced.
- Linking ideas to the IB Core.
- Linking big ideas to answer real life Chemistry problems. For example. Linking the quantum mechanical model of the atom to the periodic table. Deducing Lewis structures, electron domain and molecular geometries of oxoanions. Explanation of structure, bonding, and properties of aluminium chloride. Evaluation of scientific discovery by reasoning, experimentation, serendipity, and creativity. Identifying an unknown by linking spectroscopy and elemental analysis. Application of unfamiliar redox reactions to titration calculations. Using the calculation of propagated experimental uncertainty to report results appropriately. Evaluating the validity of a conclusion drawn from experimental data. Explaining the effect of changing conditions on the equilibrium constant. Exploration of the work of Fritz Haber: Should scientists be held morally responsible for their actions?

Knowledge, understanding & skills

Term 1:

Particulate theory of matter, use of nuclear notation, isotopic abundance calculation. Electron configuration: hydrogen emission spectrum; application of the Aufbau principle, Hund's rule, and the Pauli exclusion principle to electron configuration in terms of s-, p- and d-orbitals in subshells. The periodic table arrangement of elements in blocks, groups and periods; deduction of position from electron configuration and vice versa. Vertical and horizontal periodic trends in atomic radius, ionic radius, ionization energy, electron affinity and electronegativity; trends in metallic and non-metallic behaviour; acid-base trend of oxides across a period; acid deposition; reactivity trends in group 1 and 17. Ionic bonding and structure, covalent bonding, covalent structures, VSEPR theory, intermolecular forces, metallic bonding. Application of bonding to materials properties. Fundamentals of organic chemistry: Identification of classes and functional groups; construction of models, nomenclature. Combustion and its challenges.

Term 2:

The mole concept, reacting masses and volumes, gas laws. Formula determination, relative atomic mass investigation, standard solutions, titration, uncertainties and errors in measurement and results. Calorimetry, experimental limitations, graphical techniques. Bond enthalpies; Hess's law: application using cycles and summation.

Term 3:

Rate of chemical change, kinetic molecular theory, collision theory, experimental techniques, use of spreadsheets, catalysts. Dynamic equilibrium, application of le Chatelier's principle to predict the qualitative effects of changes of conditions; the equilibrium law, Kc, reaction quotient Q. Collaborative nature of science; interdisciplinary skills, application of 21st century communication skills, critical awareness of ethical implications of the use of science and technology, international and local dimensions.

Entry requirements: To study IB SL Chemistry students require at least grade 5 in GCSE Chemistry or at least 55 in GCSE Combined Science with at least 5 in the Chemistry components, and grade 5 GCSE Mathematics.

How will we assess impact?

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

How can you enhance your learning at home?

- Chemguide
- Isaac chemistry
- Inthinking chemistry
- Royal Society of Chemistry

Suggested homework tasks

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

Practical activity preparation, simulations, and follow-up.

International Opportunities

Visits Programme

- **Chemistry in Action lecture visit on international themes with globally renowned speakers**
- **International day across the school**
- **Geneva visit to CERN and UN organisations**
- **Potential opportunities to engage in science in exchange partner schools exploring different approaches to science learning methods**

Within the curriculum

The Chemistry IBS 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 Royal Society of Chemistry Schools’ Analyst Competition.

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

The IBDP collaborative sciences project provides an excellent opportunity for students to engage with global issues.