

Chemistry:

Unit 1: The Big Ideas of Chemistry

The story of chemistry begins with the building of the Periodic Table from speculation, debate and experimental evidence. The electron configuration of an element, its tendency to form a particular bond type and its ability to behave as an oxidant or reductant can all be linked to its position in the Periodic Table. Students study the models for metallic, ionic and covalent bonding. They consider the widespread use of polymers as an example of the importance of chemistry to their everyday lives.

Students use the language of chemistry, its symbols and chemical formulas and equations, to explain observations and data collected from experiments.

Unit 2: Environmental Chemistry

Living things on earth have evolved to use water and the gases of the atmosphere in the chemical reactions that sustain them. The atmosphere supplies life-giving gases, provides temperature that sustains life, and gives protection from harmful radiation. Students will investigate how chemistry is used to respond to the effects of human activities on our environment. Quantitative chemical calculations play an essential role and students are introduced to the types of calculations used every day by analytical chemists.

Students are introduced to new, cleaner and more efficient chemical processes that have been designed using green chemistry principles.

Unit 3: Chemical Pathways

In this unit students investigate the scope of techniques available to the analytical chemist. Each technique of analysis depends on a particular property or reaction of the chemical being investigated. Students investigate organic reaction pathways and the chemistry of particular organic molecules. A detailed knowledge of the structure and bonding of organic chemicals is important to the work of the synthetic organic chemist.

Students investigate the role of organic molecules in the generation of biochemical fuels and forensic analysis.

Unit 4: Chemistry at Work

In this unit students investigate the industrial production of chemicals and the energy changes associated with chemical reactions. Chemical reactions produce a diverse range of products we use and depend on every day. Features that affect chemical reactions such as the rate and yield or equilibrium position are investigated. Students explore how an understanding of these features is used to obtain optimum conditions in the industrial production of a selected chemical. Students investigate how energy is produced from available resources and consider the efficiencies, advantages and disadvantages of each energy resource. Galvanic cells and electrolytic cells operate by transforming chemical and electrical energy.

Students investigate their operating principles, both in the laboratory and in important commercial and industrial applications including fuel cells.

