VCE Chemistry Units 1 and 2: 2016–2022; Units 3 and 4: 2017–2023

Study Summary

|  |
| --- |
| **Please Note: This study summary includes excerpts from the VCE Chemistry Study Design. The summary is not a substitute for the VCE Study Design. Users are advised to consult the VCAA website to view the full accredited study design and other resources.** |

Staged implementation

The accreditation period for the revised study design for Units 1 and 2 begins 1 January 2016.

The accreditation period for the revised study design for Units 3 and 4 begins 1 January 2017.

Scope of study

VCE Chemistry enables students to explore the relationship between materials and energy through four themes: the design and composition of useful materials, the reactions and analysis of chemicals in water, the efficient production and use of energy and materials, and the investigation of carbon-based compounds as important components of body tissues and the materials used in society.

An important feature of VCE Chemistry is the opportunity for students to undertake a range of inquiry tasks both collaboratively and independently. Inquiry methodologies can include laboratory experimentation, modelling, site tours, fieldwork, local and remote data-logging, simulations, animations, literature reviews and the use of global databases. Students pose questions, formulate hypotheses, collect and analyse data, evaluate methodologies and results, justify conclusions, make recommendations and communicate their findings.

As well as an increased understanding of scientific processes, students develop capacities that enable them to critically assess the strengths and limitations of science, respect evidence-based conclusions and gain an awareness of the ethical, social and political contexts of scientific endeavours.

Rationale

VCE Chemistry enables students to explore the nature of chemicals and chemical processes. In undertaking this study, students apply chemical principles to explain and quantify the behaviour of matter, as well as undertake practical activities that involve the analysis and synthesis of a variety of materials.

Structure

The study is made up of four units:

Unit 1: How can the diversity of materials be explained?

Unit 2: What makes water such a unique chemical?

Unit 3: How can chemical processes be designed to optimise efficiency?

Unit 4: How are organic compounds categorised, analysed and used?

Entry

There are no prerequisites for entry to Units 1, 2 and 3. Students must undertake Unit 3 prior to undertaking Unit 4. Students entering Unit 3 without Units 1 and/or 2 may be required to undertake additional preparation as prescribed by their teacher.

Unit 1: How can the diversity of materials be explained?

The development and use of materials for specific purposes is an important human endeavour. In this unit students investigate the chemical properties and practical applications of a range of materials including metals, crystals, polymers, nanomaterials and giant lattices. They explore and explain the relationships between properties, structure and bonding forces within and between particles that vary in size from the visible through to nanoparticles, molecules and atoms. Students are introduced to quantitative concepts in chemistry.

Unit 2: What makes water such a unique chemical?

Water is the most widely used solvent on Earth. In this unit students explore the physical and chemical properties of water, the reactions that occur in water and various methods of water analysis.

Students examine the structure and bonding within and between water molecules in order to investigate solubility, concentration, pH and reactions in water including precipitation, acid-base and redox. They are introduced to stoichiometry and to analytical techniques and instrumental procedures analysis, and apply these to determine concentrations of different species in water samples, including chemical contaminants. Students explore the solvent properties of water in a variety of contexts and analyse selected issues associated with substances dissolved in water.

Unit 3: How can chemical processes be designed to optimise efficiency?

The global demand for energy and materials is increasing with world population growth. In this unit students explore energy options and the chemical production of materials with reference to efficiencies, renewability and the minimisation of their impact on the environment.

Students compare and evaluate different chemical energy resources and investigate the combustion of fuels. They consider the purpose, design and operating principles of galvanic cells, fuel cells and electrolytic cells and calculate quantities in electrolytic reactions. Students analyse manufacturing processes with reference to factors that influence their reaction rates and extent. They apply the equilibrium law and Le Chatelier’s principle to predict and explain the conditions that will improve the efficiency and percentage yield of chemical processes.

Unit 4: How are organic compounds categorised, analysed and used?

Carbon is the basis of the diverse compounds found in living tissues and in the fuels, foods, medicines and many of the materials we use in everyday life. In this unit students investigate the structural features, bonding, reactions and uses of the major families of organic compounds including those found in food.

Students process data from instrumental analyses to confirm or deduce organic structures, and perform volumetric analyses to determine the concentrations of organic chemicals in mixtures. They predict the products of reaction pathways and design pathways to produce particular compounds from given starting materials. Students investigate key food molecules including carbohydrates, proteins, lipids and vitamins and use calorimetry to determine the energy released in the combustion of food.

Assessment

Satisfactory completion

The award of satisfactory completion for a unit is based on a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher’s assessment of the student’s performance on assessment tasks designated for the unit.

Levels of achievement

*Units 1 and 2*

Procedures for the assessment of levels of achievement in Units 1 and 2 are a matter for school decision.

*Units 3 and 4*

The Victorian Curriculum and Assessment Authority will supervise the assessment of all students undertaking Units 3 and 4. In the study of VCE Chemistry the student’s level of achievement will be determined by School-assessed Coursework as specified in the VCE Chemistry study design and external assessment.

Percentage contributions to the study score in VCE Chemistry are as follows:

* Unit 3 School-assessed Coursework: 16 per cent
* Unit 4 School-assessed Coursework: 24 per cent
* End-of-year examination: 60 per cent.