Chemistry

Subject Guide

Chemistry investigates the composition and behaviour of matter and uses chemical models to explain chemical reactions and processes. Chemistry underpins the production and development of energy, the maintenance of clean water and the production of food, medicines and new materials.

This course enables students to use models, theories and concepts to explain, analyse and make predictions about chemical phenomena using chemical terminology and methodology to solve problems.

In VCE Chemistry, students consider the relationship between materials and energy and explore the key processes related to the behaviour of matter.

Students develop a range of inquiry skills involving practical experiments and research. This subject can lead to a variety of career pathways, including engineering, dietetics, forensic science, medicine, pharmacy and veterinary science.

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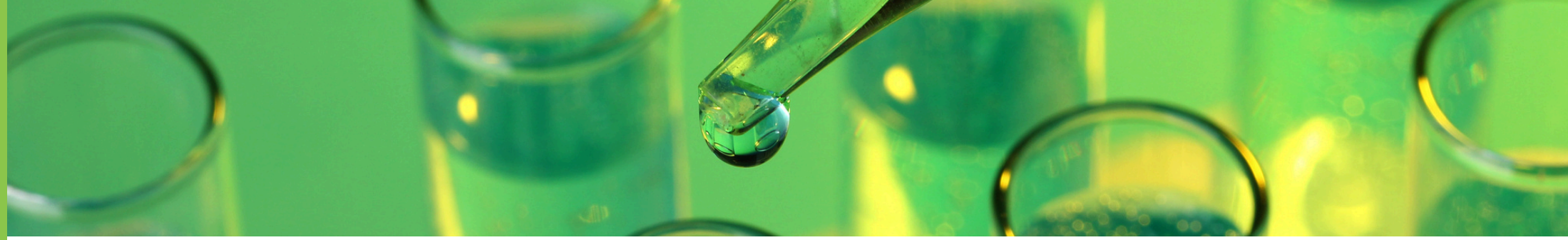


Unit focus areas

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

In this unit, students investigate the chemical properties of a range of materials, including covalent compounds, metals, salts, and polymers. Students are introduced to ways that chemical quantities are measured and consider how manufacturing innovations leads to the productions of more sustainable products, the transition from a linear economy to a circular economy.

The key knowledge includes:

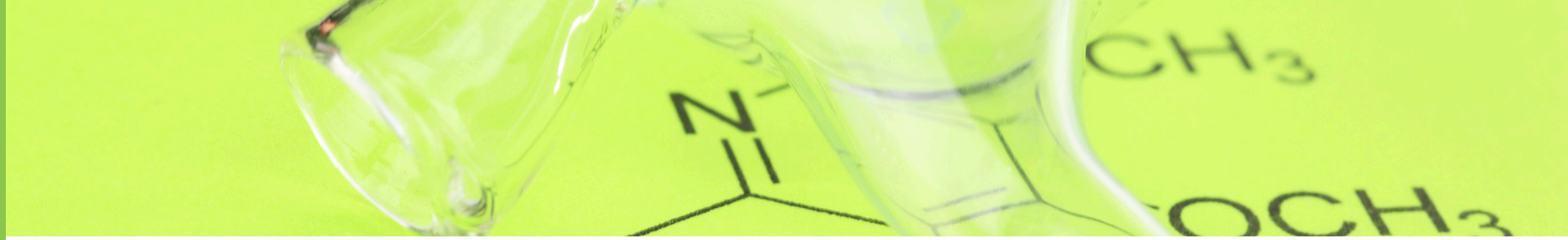
- the nature of chemical elements, their atomic structure and electron configuration as well as their position in the periodic table
- the identification of critical elements and the importance of the recycling process for element recovery
- the structure, properties and reactions of metals and ionic compounds
- the properties of carbon lattices and molecular substances in terms of structure and bonding
- the mole concept and calculations of mole quantities
- the formation of polymers, their properties and uses in society.

Unit 2 – How do chemical reactions shape the natural world?

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 design and undertake a quantitative practical investigation.

The key knowledge includes:

- the specific heat capacity and latent heat properties of water
- the properties of acid-base and redox (electron transfer) reactions in water
- using analytical techniques to investigate water samples for the presence of salts, acids and bases and organic compounds
- ·the use of solubility tables and solubility graphs to predict experimental determination of ionic compound solubility; the effect of temperature on the solubility of a given solid, liquid or gas in water
- calculations involving the ideal gas equation and molar volume to determine the mass of a gas produced by a chemical reaction.



Unit focus areas continued

Unit 3 – How can design and innovation help to optimise chemical processes?

In this unit, students explore energy options and the chemical production of materials in reference to efficiencies, renewability and minimising their impact on the environment.

The key knowledge includes:

- the quantitative differences between fuels in relation to combustion products and energy outputs
- using knowledge of the electrochemical series to design, construct and test galvanic cells
- evaluating energy resources in terms of energy efficiency, renewability and environmental impact
- applying rate and equilibrium principles to predict how the rate and extent of chemical reactions can be optimised the role of electrolysis in the production of chemicals and the recharging of batteries.

Unit 4 – How are carbon-based compounds designed for purpose?

Students investigate structural features, bonding, typical reactions and uses of the major families of organic compounds, including those found in food. A student-led practical investigation related to energy and/or food will also be undertaken.

The key knowledge includes:

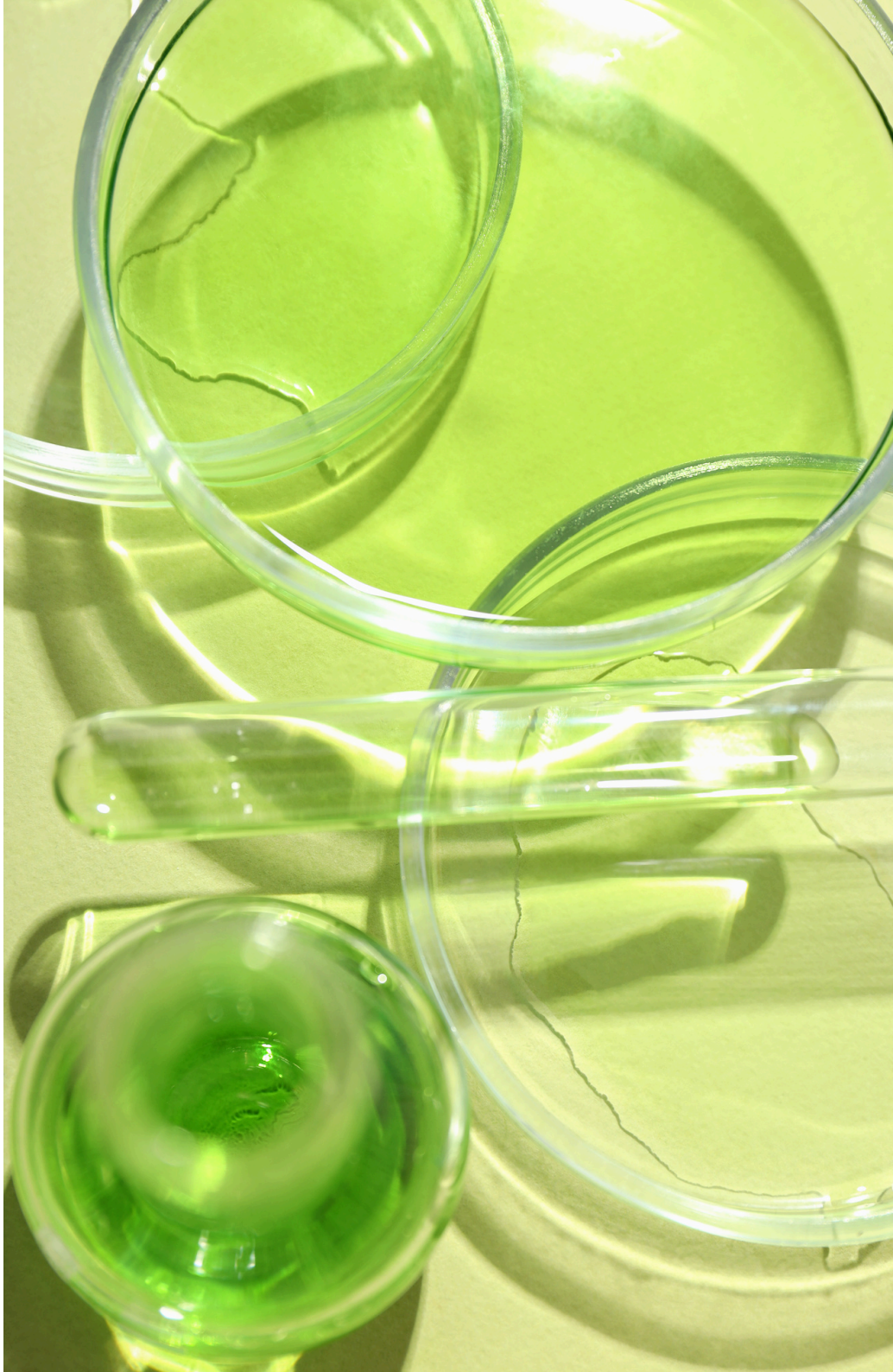
- a comparison of the general structures and reactions of the major organic compounds
- using instrumental data analysis to determine the structure of organic compounds
- designing reaction pathways for the synthesis of organic molecules
- function of some organic compounds in medicines.

Pre-requisites

Students undertaking Units 1 and 2 Chemistry need to have completed Year 10 Science (or equivalent).

Students undertaking Units 3 and 4 Chemistry need to have completed Units 1 and 2 Chemistry.

Assessment

For Units 1 and 2, a variety of assessment tasks contribute to the student's overall level of achievement. This includes laboratory reports, research investigations and tests.

For Units 3 and 4, students complete School-Assessed Coursework that includes an extended practical investigation (50%), and a two-and-a-half-hour end-of-year external examination (50%).