CHEMISTRY

Unit 3

How Can Design and Innovation help to Optimise Efficiency?

COURSE OUTLINE:

In this unit students analyse and compare different fuels as energy sources for society. They explore food in the context of supplying energy in living systems. The purpose, design and operating principles of galvanic cells, fuel cells, rechargeable cells and electrolytic cells are considered when evaluating their suitability for supplying society's needs for energy and materials.

AREAS OF STUDY:

- What are the current and future options for supplying energy?
- How can the rate and yield of chemical reactions be optimised?

OUTCOMES:

On completion of this unit, students should be able to:

1. Compare fuels quantitatively with reference to combustion products and energy outputs, apply knowledge of the electrochemical series to design, construct and test primary cells and fuel cells, and evaluate the sustainability of electrochemical cells in producing energy for society.

2. To experimentally analyse chemical systems to predict how the rate and extent of chemical reactions can be optimised, explain how electrolysis is involved in the production of chemicals, and evaluate the sustainability of electrolytic processes in producing useful material for society.

ASSESSMENT:

Assessment Tasks for Unit 3 and 4

- Comparison and evaluation of chemical concepts, methodologies and methods, and findings from at least two practical activities
- Analysis and evaluation of a chemical innovation, research study, case study, socio-scientific issue, or media communication

Final assessment - S or N based on the demonstrated achievement of the outcomes specified for the unit. School-Assessed Coursework for Unit 3 will contribute 16% to the final assessment, for Unit 4 will contribute 24% to the final assessment. The final examination will contribute 60% to the final assessment.

Unit 4

How are Carbon-based Compounds Designed for Purpose?

COURSE OUTLINE:

In this unit students investigate the structures and reactions of carbon-based organic compounds, including considering how green chemistry principles are applied in the production of synthetic organic compounds. They study the metabolism of food and the action of medicines in the body. They explore how laboratory analysis and various instrumentation techniques can be applied to analyse organic compounds in order to identify them and to ensure product purity.

AREAS OF STUDY:

- How are organic compounds and categorised and synthesised?
- How are organic compounds analysed and used?
- How is scientific inquiry used to investigate the sustainable production of energy and/or materials?

OUTCOMES:

On completion of this unit, students should be able to:

1. Analyse the general structures and reactions if the major organic families of compounds, design reaction pathways for organic synthesis, and evaluate sustainability.

2. Apply qualitative and quantitative tests to analyse organic compounds and their structural characteristics, deduce structures of organic compounds using instrumental analysis data, explain how some medicines function, and experimentally analyse how some natural medicines can be extracted and purified

3. Design and conduct a scientific investigation

ASSESSMENT:

- Analysis and evaluation of primary and/or secondary data, including identified assumptions or data limitations, and conclusions
- Problem-solving, including calculations, using chemistry concepts and skills applied to real-world concepts