Year 11 Chemistry: Unit 1 – Chemical fundamentals- structure, properties and reactions & Unit 2 –Molecular interactions and reactions
Term 1

Unit 1: In Unit 1, students relate matter and energy in chemical reactions as they consider the breaking and reforming of bonds as new substances are produced. The properties of a material depend on, and can be explained by, the material's structure. A range of models at the atomic and molecular scale enable explanation and prediction of the structure of materials, and how this structure influences properties and reactions.

Students conduct investigations to develop their understanding of patterns in the properties and composition of materials. They explore the structure of materials by describing physical and chemical properties at the macroscopic scale, and use models of structure and primary bonding at the atomic and subatomic scale to explain these properties. They are introduced to the mole concept as a means of quantifying matter in chemical reactions.

Contexts that could be investigated in this unit include history of atomic model development, use of radioisotopes, energy transfers in industry and the human body, and analysis of elements in living things. Students can also use materials that they encounter in their lives as a context for investigating the relationships between structure and properties.

Participation in a range of experiments and investigations will allow students to progressively develop their suite of science inquiry skills while gaining an enhanced appreciation of chemical structure and properties, and reaction enthalpy. Collaborative experimental work also helps students to develop communication, interaction, and self-management skills.

Throughout the unit, students develop skills in observation, experimentation and data analysis to describe and explain periodicity, material chemistry and energy transfers in chemical reactions.

Unit 2: In Unit 2, students develop their understanding of the physical and chemical properties of materials including gases, water, aqueous solutions, acids and bases. Students explore the characteristic properties of water that make it essential for physical, chemical and biological processes on Earth, including the properties of aqueous solutions. They investigate and explain the solubility of substances in water, and compare and analyse a range of solutions. They learn how rates of reaction can be measured and altered to meet particular needs, and use models of energy transfer and the structure of matter to explain and predict changes to rates of reaction. Students gain an understanding of how to control the rates of chemical reactions, including through the use of a range of catalysts.

Students conduct investigations of chemical reactions, including the prediction and identification of products, and the measurement of the rate of reaction. They investigate the behaviour of gases, and use the kinetic theory to predict the effects of changing temperature, volume and pressure in gaseous systems.

Contexts that could be investigated in this unit include forensic chemistry, and acids in the atmosphere and ocean, such as rain, blood chemistry, water quality and the importance of enzymes. Through appropriate contexts, students explore how evidence from multiple disciplines and individuals and the development of ICT, and other technologies have contributed to developing understanding of intermolecular forces and chemical reactions.

Participation in a range of experiments and investigations will allow students to progressively develop their suite of science inquiry skills while gaining an enhanced appreciation of materials, mixtures, reactions and underpinning models and theories. Collaborative experimental work also helps students to develop communication, interaction, and self-management skills.

Throughout the unit, students develop skills in observation, design, experimentation and data analysis to describe and explain material chemistry, solutions and rates of reactions.

Unit objectives

Unit objectives are drawn from the syllabus objectives and are contextualised for the subject matter and requirements of the unit. Each unit objective must be assessed at least once.

Students will:
1. describe and explain chemical equilibrium systems and oxidation and reduction
2. apply understanding of chemical equilibrium systems and oxidation and reduction
3. analyse evidence about chemical equilibrium systems and oxidation and reduction
4. interpret evidence about chemical equilibrium systems and oxidation and reduction
5. investigate phenomena associated with chemical equilibrium systems and oxidation and reduction
6. evaluate processes, claims and conclusions about chemical equilibrium systems and oxidation and reduction
7. communicate understandings, findings, arguments and conclusions about chemical equilibrium systems and oxidation and reduction

Unit Assessment

IA2 – Student Experiment
Timing: Handed out Term 3, week 2 and is due Term 3, week 7.

Lesson sequence

W1 Rates of reactions Unit 2 Topic 3 Ch 19 p422	Review Measurement and Error
	Collision Theory
	Maxwell-Boltzmann Measuring rates of reactions and Calculations Catalyst (p434-439)
W2 Rates of reactions Unit 2 Topic 3 Ch 19.3 Use this mandatory prac for the assessment**	IA2 Mandatory Prac ** Investigate the rates of chemical reactions
	Graphing results and calcs…
	Answers and calcs cont… – encourage stns to start rationale -
W3	IA2 Panning IA2 and choosing the modifications for the prac
	IA2 Planning and writing up prac
	IA2 Planning and writing up prac
W4	IA2 Do the prac with their Mods and collect data
	IA2 Data Analysis

	IA2 Analysis and Evaluation
W5	IA2 Analysis and Evaluation
	IA2 Draft Due!
	IA2 Work on final copy
W6 Exothermic and Endothermic reactions Ch 19.2 p430 Energy profile diagrams p430 Unit 1 Topic 3 Ch 9 p202	Energy Profile Diagrams Chemical Energy and Thermochemistry
	Hess's Law
	Specific Heat Capacity
W7 Fuels Unit 1 Topic 3 Ch 11 p248	IA2 SUBMIT FINAL COPY Mandatory Prac
	Specific Heat Capacity cont…..
	Compare Fuels
W8 SWAP WK 8 and 9 Reactions of Acids Unit 2 Topic 2 Ch 18 p412	Acids & Bases
	Acids and metals Acids and Carbonates
	Equations
W9 pH Unit 2 Topic 2 Ch 17 p400	pH
	Arrhenius Model
	Mandatory Prac- Investigate the properties of strong and weak acids
W10 Analytical Techniques Ch 5 p104 Unit 1 Topic 1	Atomic absorption and emission spectra Analysis of data (most important)
	Flame test AAS As examples of analytical techniques
	Mass Spectrometry Calculation of relative atomic mass % abundance of isotopes of an element from data (most important)