Lesson Plans

Year 9 Science Chapter 5

Chemical Reactions I

Some general points about the following lesson plans:

- ★ The lesson plans outline only one way of sequencing the learning material in this chapter of the textbook.
- ★ The content and sequence will obviously vary from class to class (The following guide is ambitious in many instances).
- ★ All activities and investigations in each chapter have been deliberately designed to support the National Curriculum content whilst keeping in mind the development and reinforcement of skills required in the study of science in Year 11/12.
- ★ The length of lessons vary from school to school and even within schools. The following guide is based on 35/40 min lessons because it was reasoned that adjustment to 60/75/90 mins lessons would be easier than reducing lesson plans.
- ★ Students may be challenged further by completing each chapter Task, Competition Questions, Challenges, and by finding and entering any of the many competitions, challenges, projects etc that may be found on the Internet. Such students may benefit by doing an Internet search early in the year and planning entries before they close.

Assessment

A Task p101
End of Unit Test

Content Description (5 weeks)

Chapter 5 Chemical Reactions I

Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed (ACSSU178)

- ★ Identify reactants and products in chemical reactions.
- ★ Model chemical reactions in terms of rearrangement of atoms.
- ★ Describe observed reactions using word equations.
- ★ Consider the role of energy in chemical reactions.
- ★ Recognise that the conservation of mass in a chemical reaction can be demonstrated by simple chemical equations.

Content structure

The Australian Curriculum: Science has three interrelated strands: *Science Understanding, Science as a Human Endeavour and Science Inquiry Skills*.

Together, the three strands of the science curriculum provide students with understanding, knowledge and skills through which they can develop a scientific view of the world. Students are challenged to explore science, its concepts, nature and uses through clearly described inquiry processes.

Science Understanding

Science understanding is evident when a person selects and integrates appropriate science knowledge to explain and predict phenomena, and applies that knowledge to new situations. Science knowledge refers to facts, concepts, principles, laws, theories and models that have been established by scientists over time.

The **chemical sciences** sub-strand is concerned with understanding the composition and behaviour of substances. The key concepts developed within this sub-strand are that: the chemical and physical properties of substances are determined by their structure at an atomic scale; and that substances change and new substances are produced by rearranging atoms through atomic interactions and energy transfer. In this sub-strand, students classify substances based on their properties, such as solids, liquids and gases, or their composition, such as elements, compounds and mixtures. They explore physical changes such as changes of state and dissolving, and investigate how chemical reactions result in the production of new substances. Students recognise that all substances consist of atoms which can combine to form molecules, and chemical reactions involve atoms being rearranged and recombined to form new substances. They explore the relationship between the way in which atoms are arranged and the properties of substances, and the effect of energy transfers on these arrangements.

Science Inquiry Skills

Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments.

Science as a Human Endeavour

Through science, humans seek to improve their understanding and explanations of the natural world. Science involves the construction of explanations based on evidence and science knowledge can be changed as new evidence becomes available. Science influences society by posing, and responding to, social and ethical questions, and scientific research is itself influenced by the needs and priorities of society. This strand highlights the development of science as a unique way of knowing and doing, and the role of science in contemporary decision making and problem solving. It acknowledges that in making decisions about science practices and applications, ethical and social implications must be taken into account. This strand also recognises that science advances through the contributions of many different people from different cultures and that there are many rewarding science-based career paths.

Science across Foundation to Year 12

Years 7–10, typically students from 12 to 15 years of age, Curriculum focus: explaining phenomena involving science and its applications

During these years, students continue to develop their understanding of important science concepts across the major science disciplines. It is important to include contemporary contexts in which a richer understanding of science can be enhanced. Current science research and its human application motivates and engages students.

Within the outlined curriculum, students should undertake some open investigations that will help them refine their science inquiry skills. The quantitative aspects of students' inquiry skills are further developed to incorporate consideration of uncertainty in measurement. In teaching the outlined curriculum, it is important to provide time to build the more abstract science ideas that underpin understanding.

Chapter 5 Chemical Reactions I (5 weeks)

Lesson	Method	Resources
1	□ General (covering book, ruling pages, paste study guide etc.) □ Purpose of chapter □ Introduce/discuss: Chemical reaction p102 □ Discuss example: Burning methane gas p102 □ Exercise p102 □ HW: Complete exercise p102	
2	□ Short test: Burning methane gas □ Demonstrate each example p103 followed by exercise □ HW: Complete exercises p103	
3	□ Short test: Writing symbolic equations and counting atoms □ Demonstrate deciding if equations are balanced p104 □ Work examples p104 with students □ Exercise p104 (Repeat as necessary) □ HW: Complete exercise p104	
4	□ Short test: Are these equations balanced? □ Balancing equations p105 □ Work examples p105 with students □ Exercise p105 (Repeat as necessary) □ Try some online 'balance chemical equation' applications and videos □ HW: Complete exercise p105	Internet
5	□ Short test: Balance a couple of equations □ Types of reactions p106 □ Combination reactions p106 □ Activity: Is rusted iron heavier than iron? p107 □ HW: Combination reactions	Activity material p107
6	□ Short test: What is a combination reaction? □ Activity: Which metal will more readily oxidise? p107 □ Exercise p107 □ HW: Complete exercise p107	Activity material p107
7	□ Short test: Balance a couple of equations, what is a combination reaction? □ Decomposition reaction p108 □ Activity: Decomposition of ammonium carbonate p109 □ Exercise p109 □ HW: Complete exercise p109, Challenge p109	Activity material p109
8	□ Short test: What is a combination reaction, a decomposition reaction? □ Replacement reaction p110 □ Activity: Copper wire in a silver nitrate solution p111 □ Activity: A nail in a copper sulphate solution p111 □ HW: Combination, decomposition, replacement reactions	Activity material p111
9	□ Short test: Combination, decomposition, replacement reactions □ Replacement reaction p110 □ Watch online videos demonstrating 'single replacement/displacement reactions' □ Exercise p111 □ HW: Complete exercise p111	Internet
10	□ Short test: Combination, decomposition, replacement reactions □ Double replacement reactions p112 □ Watch some online videos demonstrating 'double replacement reactions' □ Watch some online videos demonstrating 'silver nitrate and sodium chloride' reaction □ HW: Double replacement reactions	Internet

Chapter 5 Chemical Reactions I (5 weeks)

Lesson	Method	Resources
11	Short test: Combination, decomposition, replacement reactions Double replacement reactions p112 Activity p113 HW: Combination, decomposition, replacement reactions	Materials for activity p113
12	Short test: Combination, decomposition, replacement reactions Double replacement reactions p112 Neutralisation reactions p113 Exercise p113 HW: Complete exercise p113	
13	Short test: Combination, decomposition, replacement reactions Energy p114 Watch online videos 'exothermic reactions' and 'endothermic reactions' Exercise p115 HW: Complete exercise p115	Internet
14	Short test: Combination, decomposition, replacement reactions, energy Energy p114 Activity p115 Endothermic or exothermic HW: Review balancing equations p105	Materials for activity p115
15	Short test: Combination, decomposition, replacement reactions Conservation of mass p116 Exercise p116 Challenges p117 HW: Compile Word bank p117	Internet
16	Short test: Combination, decomposition, replacement reactions, energy, conservation of mass Conservation of mass p116 Activity p117 Conservation of mass Exercise p117 HW: Complete exercise p117	Materials for activity p117
17	Short test: Combination, decomposition, replacement reactions, energy, conservation of mass, balancing equations Metal extraction p118 Watch some online videos on the use of 'blast furnaces' to make iron (Fe) Exercise p118 HW Complete exercise p118	Internet
18	Short test: Combination, decomposition, replacement reactions, energy, conservation of mass, balancing equations Respiration p119 Exercise p119 Challenge p119 HW: Complete challenge p119	
19	Science Inquiry p121 HW: Science Inquiry p121	
20	Science Inquiry p121 HW: Science Inquiry p121	

Chapter 5 Chemical Reactions I (5 weeks)

Lesson	Method	Resources
21	Chapter Review and Task □ Exercises p122, p123 □ Begin work on 'A Task' p101 □ HW: Complete exercises & work on task as required	
22	Chapter Review and Task □ Exercises p124 □ Sweet trick p125 □ Continue work on 'A Task' p101 □ HW: Complete exercises & work on task as required. □ HW: Show sweet trick to family members	
23	Chapter Review and Task □ Exercises p126 and Competition Questions p127 □ Continue work on 'A Task' p101 □ HW: Complete exercises & work on task as required	
24	Chapter Review and Task □ Harder test questions p128 □ Preparation for test □ Continue work on 'A Task' p101 □ HW: Prepare for test & work on task as required	
25	□ End of chapter/unit test	