

Term 3: CHEMICAL SCIENCES & SCIENCE SKILL
10 weeks or 30 lessons**Year _7_ Australian Curriculum Achievement Standard:***Science Understanding:*

By the end of Year 7, **students describe techniques to separate pure substances from mixtures**. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of Earth, the sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of human and environmental changes on interactions between organisms and classify and organise diverse organisms based on observable differences.

Science as human endeavour:

Students describe situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem. **They explain possible implications of the solution for different groups in society.**

Science Inquiry Skills:

Students **identify questions that can be investigated scientifically**. They **plan fair experimental methods, identifying variables to be changed and measured**. They **select equipment that improves fairness and accuracy** and **describe how they considered safety**. Students **draw on evidence to support their conclusions**. They summarise data from different sources, **describe trends and refer to the quality of their data when suggesting improvements to their methods**. They **communicate their ideas, methods and findings using scientific language and appropriate representations**.

See Unit 1 and Unit 2 (C2Cs) for extra details and resources

Unit Overview:

In this unit students differentiate between **pure substance and mixtures**. Students understand mixtures, in the form of suspensions, and solutions. Students understand and apply **range of separation methods** that include decantation, sedimentation, flotation, filtration, evaporation, and distillation. Students will identify questions and problems and develop predictions based on science knowledge and understanding. Students will collaboratively plan investigations using fair testing principles. Students will conduct accurate and reliable **investigations into the separation of mixtures** and use the collected data and data from other sources to draw conclusions about separation techniques. Students will communicate findings using factorial and procedural explanation genres in the form of scientific reports.

Assessment Overview:**Task: Summative Student Experiment (Item 3)****Key Skill/s:**

- Comprehensively **describe** and **explain** scientific information, concepts and relationships
- Formulate research questions and a hypothesis to be scientifically investigated
- Modify a method that reflects fair testing principles
- Analysis of trends in data to draw conclusions about relationships between variables
- Evaluation of investigation and recommendations
- Communicate effectively, using proper sentences and grammar

Conditions:

- 4 lessons in class time
- Experiment conducted in groups
- Student experiment report written individually

Guaranteed Vocabulary:	Design Question Three Strategy	Design Question Four Strategy	21 st Century Skill:
<ul style="list-style-type: none"> Pure substance, Mixture, suspension, Solution, solvent, solute, dissolved, soluble, insoluble Separation, Decanting, Sedimentation, Flotation, Sieving, Filtration, Evaporation, Liquid Water, solid ice, vapour gas Water, water runoff, Water treatment plant: desalination, distillation Water Cycle: evaporation, transpiration, condensation, precipitation 	<ul style="list-style-type: none"> Use concept map to explore the different types of separation Use Venn Diagram to compare mixtures and pure substances Use Frayer Model to represent important vocabulary Use cause and effect organisers 	<ul style="list-style-type: none"> Teach students the hypothesis format if...<i>then</i>...<i>because</i> Engage students in complex tasks that require students to generate and test hypotheses in collaborative groups 	<ul style="list-style-type: none"> Use of ICT for learning Self-regulation within a collaborative setting
Guaranteed Skills/Language Features:	Reading Comprehension Skill and Strategy	Cognitive Verbs and Key Terms:	ICT to Enhance Learning:
<p>Scientific Report using procedural recount, descriptive reporting and simple factorial explanation including cause and effect sequence</p> <p>Numeracy: finding the mean of a number set, graphing</p>	<ul style="list-style-type: none"> Synthesising <ol style="list-style-type: none"> <i>Frayer Model (P.84, P.237)</i> <i>Concept Maps (P.83, P236 template)</i> Making Inferences <ol style="list-style-type: none"> <i>Connect Two (P.87)</i> <i>Hands on Reading (P.115, P.245)</i> 	<ul style="list-style-type: none"> Describing <ol style="list-style-type: none"> <i>Frayer Model</i> <i>Concept Maps</i> Explaining <ol style="list-style-type: none"> <i>Cause and Effect</i> Comparing <ol style="list-style-type: none"> <i>Venn Diagram</i> 	<ul style="list-style-type: none"> Use Oxford big ideas o-book and assess for digital tools Use digital simulations

Strands and Sub-Strands	Australian Curriculum Content Descriptors	Kirwan High Goals – Students will know and/or be able to
SCIENCE UNDERSTANDING		
Chemical Sciences	<ul style="list-style-type: none"> Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques (ACSSU113) 	<p>Describe and explain the key characteristics of pure substance and mixtures (including suspensions & solutions).</p> <p>Classify a given substance as a mixture or a pure substance.</p> <p>Classify a given mixture as a suspension or a solution.</p> <p>Describe, explain and distinguish the ways in which suspension and solution type mixtures can be separated.</p> <p>Select and justify the best way to separate a given mixture</p> <p>Describe and explain the movement of water through the Earth's spheres (water cycle)</p> <p>Compare difference in water quality and their uses</p>

SCIENCE AS HUMAN ENDEAVOUR

Use and influence of science	<ul style="list-style-type: none"> Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE120) Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management (ACSHE121) People use understanding and skills from across the disciplines of science in their occupations (ACSHE224) 	<p>Describe the need for, and the influence of, using different types of science to solve problems associated with making soiled water usable for human use.</p> <p>Explain how the solutions for making water usable for human use impacts different groups in society.</p>
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SCIENCE INQUIRY SKILLS

Questioning & predicting	<ul style="list-style-type: none"> Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (AC SIS124) 	<p>Identify research questions that</p> <ol style="list-style-type: none"> Inform the research for the rational of the investigation inform the rational and the hypothesis of the investigation focuses the planning and conducting of the investigation <p>focuses the processing and analysing of the data</p>
Planning and conducting	<ul style="list-style-type: none"> Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125) In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task (AC SIS126) 	<ol style="list-style-type: none"> Examine relevant background scientific information to: <ol style="list-style-type: none"> construct a rational that provides a set of logical reasons for the actions taken in the investigation that is linked to the research question make modification of the given methodology that result in reliable, relevant raw data. identify and escribe relevant risk associated with experiment.

Processing and analysing and information	<ul style="list-style-type: none"> Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate (AC SIS129) Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions (AC SIS130) 	<ol style="list-style-type: none"> Use given algorithms to process raw data Analyse experimental data to <ol style="list-style-type: none"> identify trends, patterns and relationships using given representation styles identify and describe inconsistencies in results Summarise data to draw relevant conclusions
Evaluating	<ul style="list-style-type: none"> Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method (AC SIS131) Use scientific knowledge and findings from investigations to evaluate claims 	<ol style="list-style-type: none"> Reflect on modified methods and identify improvements, to evaluate quality and reliability of the data collected Evaluate evidence-based claims using relevant background research
Communicating	<ul style="list-style-type: none"> Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (AC SIS133) 	<ol style="list-style-type: none"> Select appropriate scientific language, genre conventions and representation for a junior Student Experimental Report by <ol style="list-style-type: none"> Use of scientific drawing conventions Use of meaningful scientific vocabulary Forming simple Factorial Explanations with cause and effect sequence Use appropriate bibliography conventions

Possible Habit of Mind: QUESTIONING AND PROBLEM POSING

Exploring Meaning of the HOM By the end of this unit students will be able to: Generate hypotheses	Expanding Capacity for using the HOM By the end of this unit students will be able to: Apply understanding of hypotheses in everyday contexts	Increasing Alertness for the HOM By the end of this unit students will be able to: Recognise a hypothesis in formal and informal registers	Extending Values of the HOM By the end of this unit students will be able to: Apply understanding of hypotheses in novel contexts	Building Commitment towards the HOM By the end of this unit students will be able to: Recognise the importance and usefulness of generating hypotheses to solve both every day and complex problems
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General Capabilities: This unit provides opportunities for students to engage in following capabilities:

Literacy ✓ Comprehending texts through listening, reading and viewing ✓ Composing texts through speaking, writing and creating ✓ Text knowledge ✓ Grammar knowledge ✓ Word knowledge ✓ Visual knowledge Numeracy ✓ Estimating and calculating with whole numbers ✓ Recognising and using patterns and relationships <input type="checkbox"/> Using fractions, decimals, percentages, ratios and rates <input type="checkbox"/> Using spatial reasoning ✓ Interpreting statistical information ✓ Using measurement	ICT <input type="checkbox"/> Applying social and ethical protocols and practices when using ICT ✓ Investigating with ICT <input type="checkbox"/> Creating with ICT <input type="checkbox"/> Communicating with ICT ✓ Managing and operating ICT Critical and creative thinking ✓ Inquiring - identifying, exploring and organising information and ideas ✓ Generating ideas, possibilities and actions ✓ Reflecting on thinking and processes ✓ Analysing, synthesising and evaluating reasoning and procedures	Personal and social capability ✓ Self-awareness ✓ Self-management ✓ Social awareness ✓ Social management Ethical understanding <input type="checkbox"/> Understanding ethical concepts and issues <input type="checkbox"/> Reasoning in decision making and actions ✓ Exploring values, rights and responsibilities Intercultural understanding <input type="checkbox"/> Recognising culture and developing respect ✓ Interacting and empathising with others ✓ Reflecting on intercultural experiences and taking responsibility
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Cross Curriculum Priorities:

<input type="checkbox"/> Aboriginal and Torres Strait Islander histories and cultures	<input type="checkbox"/> Asia and Australia's engagement with Asia	✓ Sustainability
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Differentiation [for small groups or individuals]:

1. Individualise formative assessment tools provided with oxford big ideas
2. Include increased scaffolding around assigned formative assessment task where needed
3. Plan open-ended lesson tasks that require higher order thinking skills from more capable students
4. Make use of heterogeneous collaborative groups to gain different perspectives
5. Make use of homogeneous collaborative groups to tailor tiered questions
6. Attend to any individual work plan requirements
7. Collect and analyse student profiles for literacy and numeracy needs

Term 3, 2020 **Lesson Sequence: Each week ideally has at least 1 comprehension/writing and 1 Practical/Hands on focused lesson.**

Week	Day 1	Day 2	Day 3
1 13/7	INTRODUCTION TO CHEMISTRY <ul style="list-style-type: none"> Reiterate rules and expectations Set up notebooks for term 3 Introduce pure substances and mixtures 	PURE SUBSTANCES V MIXTURES <ul style="list-style-type: none"> Describe and explain the key characteristics of Pure substance and Mixtures Classify a given substance as a mixture or a pure substance Meaningful use of scientific vocabulary Extension: link to the periodic table P.118-126 OBI	PRACTICAL – PURE SUBSTANCES V MIXTURES <ul style="list-style-type: none"> Justify whether samples are Pure Substances or Mixtures Concepts of reactivity and why mixtures can be exciting Create a mixture to meet a specific purpose – e.g. sherbet
2 20/7	SOLUTIONS V SUSPENSIONS – DESCRIBE AND EXPLAIN <ul style="list-style-type: none"> Describe and explain the key characteristics: <ul style="list-style-type: none"> Clear/opaque Particle size sedimentation Meaningful use of scientific vocabulary SW1 pg 295-297 Questions pg 298		PRACTICAL - SOLUTIONS V SUSPENSIONS <ul style="list-style-type: none"> Identify solutions and suspensions Create solutions and suspensions SW1: Pg 299 <ul style="list-style-type: none"> Solubility, temperature and particle size
3 27/7	SEPARATING MIXTURES – DESCRIBE AND EXPLAIN <ul style="list-style-type: none"> Describe, explain and distinguish the ways in which suspension and solution type mixtures can be separated using household equipment. Select and justify the best way to separate a given mixture Meaningful use of scientific vocabulary Simple Factorial Explanations with cause and effect sequence P.129-134 OBI P.137-145 OBI SW1: pg 300- 310		PRACTICAL- SEPARATING MIXTURES <p>Students select appropriate equipment and sequence of steps to separate a mixture</p> <ul style="list-style-type: none"> Plan steps Justify strategy Conduct test
4 3/8	REAL WORLD EXAMPLES OF MIXTURE SEPARATION <p>Eg. Oil spills, food and drink production, water quality</p> <ul style="list-style-type: none"> Research and create a poster 		PRACTICAL: SCIENTIFIC METHOD – FAIR TESTING <ul style="list-style-type: none"> Plan a fair and safe experiment about separating mixtures. Select the most suitable equipment to collect accurate measurements of variables for experiments about mixture separation

5 10/8	CREATING A HYPOTHESIS <ul style="list-style-type: none"> - Identify questions about separating mixtures that can be investigated using the scientific principles of fair testing - Make predictions about separating mixtures in the form of a justified hypothesis 	CREATE AN ACCURATE GRAPH <ul style="list-style-type: none"> • Summarise data from different sources by constructing tables and graphs. • Describe the trend of graphed data. • Explain the relationship between the independent and dependent variables of graphed data • Graph data collected from experiments. (OBI7, pg.129), (OBI7, pg.122) 	FORMATIVE ASSESSMENT **similar to final assessment but with dry mix <ul style="list-style-type: none"> • Filter a dry mixture (soil, metal, salt etc) through a pvc run modified with filters/magnets etc. • How does the mass of individual items collected change with the number of passes through the separation tube? Planning and justifying strategy (verbal, unrecorded- check against prof. scale)
6 17/8	FORMATIVE ASSESSMENT **similar to final assessment but with dry mix Testing Graphing	WATER CYCLE <ul style="list-style-type: none"> • Sources of water 	WATER CYCLE <ul style="list-style-type: none"> • Sources of pollution
7 24/8	WATER FILTRATION Natural processes Artificial filtration	WATER FILTRATION Natural processes Artificial filtration	Catch-up/extension lesson- Hand out assessment to sports academy students going on camp.
8 31/8 Y7 Sports Academy Camp	Catch-up/extension lesson	HAND OUT ASSESSMENT Students design filter	Student Free day 4/9
9 7/9	ASSESSMENT Students conduct test Film justification	ASSESSMENT Writeup report component	ASSESSMENT DUE Video component due Report due
10 14/9	Extension – mini experiments – hypothesis, test, graph, conclude e.g. does running with an umbrella slow you down? do people run faster with shorter stride lengths?		