

### Curriculum Mapping – ‘The Elements’ Kit

Level	Australian Curriculum	Victorian Curriculum
<b>F</b>	AC9SFU03: recognise that objects can be composed of different materials and describe the observable properties of those materials <ul style="list-style-type: none"> <li>• sorting and grouping materials based on observed properties such as colour, hardness, texture and flexibility</li> <li>• creating a display of different materials, naming each material and exploring language to describe properties of materials</li> </ul>	<b>F – 2</b> <b>(VCSSU044)</b> Objects are made of materials that have observable properties <ul style="list-style-type: none"> <li>• sorting and grouping materials on the basis of observable properties such as colour, texture and flexibility</li> </ul>
<b>1</b>	-	
<b>2</b>	-	
<b>3</b>	-	
<b>4</b>	-	<b>3 + 4</b> <b>(VCSSU060)</b> Natural and processed materials have a range of physical properties; these properties can influence their use <ul style="list-style-type: none"> <li>• investigating a particular property across a range of materials</li> </ul>
<b>5</b>	AC9S5U04: explain observable properties of solids, liquids and gases by modelling the motion and arrangement of particles <ul style="list-style-type: none"> <li>• classifying substances as solids, liquids and gases and investigating their properties</li> </ul>	
<b>6</b>	-	
<b>7</b>	AC9S7U05: use particle theory to describe the arrangement of particles in a substance, including the motion of and attraction between particles, and relate this to the properties of the substance <ul style="list-style-type: none"> <li>• comparing the properties of different states of matter and explaining differences using particle theory</li> <li>• investigating properties of materials such as density, melting point and compressibility and explaining these in terms of particle arrangement</li> <li>• using representations of particles to show the difference between samples of pure substances and mixtures, and identifying examples of each</li> </ul>	<b>7 &amp; 8</b> <b>(VCSSU097)</b> Differences between elements, compounds and mixtures can be described by using a particle model <ul style="list-style-type: none"> <li>• recognising that elements and simple compounds can be represented by symbols and formulas</li> <li>• explaining why elements and compounds can be represented by chemical formulas while mixtures cannot</li> </ul>

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	<ul style="list-style-type: none"> <li>analysing how the physical properties of substances in mixtures, such as particle size, density or volatility, determine the separation technique used</li> </ul>	
8	<p>AC9S8U06: classify matter as elements, compounds or mixtures and compare different representations of these, including 2-dimensional and 3-dimensional models, symbols for elements and formulas for molecules and compounds</p> <ul style="list-style-type: none"> <li>using virtual and physical models to distinguish between elements and compounds in terms of types of atoms</li> <li>examining how Dmitri Mendeleev arranged the elements in the first version of the periodic table and comparing his arrangement with the current version</li> </ul> <p>AC9S8H01: explain how new evidence or different perspectives can lead to changes in scientific knowledge</p> <ul style="list-style-type: none"> <li>researching why Dmitri Mendeleev developed a different representation of the periodic table</li> </ul>	
9	<p>AC9S9U06: explain how the model of the atom changed following the discovery of electrons, protons and neutrons and describe how natural radioactive decay results in stable atoms</p> <ul style="list-style-type: none"> <li>identifying where applications of radioactivity are used in medicine and industry such as diagnosing and treating cancer and checking for faults in materials used in aircraft and spacecraft</li> </ul> <p>AC9S9U07: model the rearrangement of atoms in chemical reactions using a range of representations, including word and simple balanced chemical equations, and use these to demonstrate the law of conservation of mass</p> <ul style="list-style-type: none"> <li>investigating why most elements are not found in their elemental state and processes which are used to obtain the element</li> </ul>	<p>9 &amp; 10</p> <p><u>(VCSSU114)</u> Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community</p> <ul style="list-style-type: none"> <li>investigating the historical development of models of the structure of the atom</li> </ul> <p><u>(VCSSU122)</u> All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms</p> <ul style="list-style-type: none"> <li>describing and modelling the structure of atoms in terms of the nucleus, protons, neutrons and electrons</li> <li>comparing the mass and charge of protons, neutrons and electrons</li> <li>describing in simple terms how alpha and beta particles and gamma radiation are released from unstable atoms</li> </ul> <p><u>(VCSSU123)</u> The atomic structure and properties of elements are used to organise them in the periodic table</p> <ul style="list-style-type: none"> <li>describing the structure of atoms in terms of electron shells</li> </ul>
10	<p>AC9S10U06: explain how the structure and properties of atoms relate to the organisation of the elements in the periodic table</p> <ul style="list-style-type: none"> <li>examining how elements are organised in the periodic table and analysing patterns to discern that elements in the same group of the periodic table have similar properties</li> <li>investigating the physical properties of some metals and non-metals</li> </ul>	

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	<ul style="list-style-type: none"> <li>• using the Bohr model of the atom to describe the structure of atoms in terms of electron shells and relating this to their properties and position in the periodic table</li> <li>• deducing that repeating patterns of the periodic table reflect patterns of electrons in outer electron shells</li> </ul> <p>AC9S10H01: explain how scientific knowledge is validated and refined, including the role of publication and peer review</p> <p>investigating how the development of the periodic table has been disputed and refined as science has progressed and new elements have been discovered</p> <p>AC9S10H02: investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering</p> <ul style="list-style-type: none"> <li>• exploring how the development of new materials and thin films has led to better computer chips and solar cells</li> </ul>	<ul style="list-style-type: none"> <li>• explaining how the electronic structure of an atom determines its position in the periodic table and its properties</li> <li>• investigating the chemical activity of metals</li> </ul>
<b>Unit 1</b>	<p>Senior Science Curriculum Version 8.4 - Chemistry</p> <p>Unit 1: Chemical fundamentals: structure, properties and reactions</p> <p>Trends in the observable properties of elements are evident in periods and groups in the periodic table (ACSCH016)</p> <p>The structure of the periodic table is based on the electron configuration of atoms, and shows trends, including in atomic radii and valencies (ACSCH017)</p>	<p>VCAA Chemistry 2023 Study Design</p> <p>Unit 1 How can the diversity of materials be explained?</p> <p>Area of Study 1 How do the chemical structures of materials explain their properties and reactions?</p> <ul style="list-style-type: none"> <li>• The definitions of elements, isotopes and ions, including appropriate notation: atomic number; mass number; and number of protons, neutrons and electrons</li> <li>• the periodic table as an organisational tool to identify patterns and trends in, and relationships between, the structures (including shell and subshell electronic configurations and atomic radii) and properties (including electronegativity, first ionisation energy, metallic and non-metallic character and reactivity) of elements</li> <li>• critical elements (for example, helium, phosphorus, rare-earth elements and post-transition metals and metalloids) and the importance of recycling processes for element recovery</li> </ul>

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		<p>Area of Study 3 How can chemical principles be applied to create a more sustainable future?</p> <p>Investigation topic 1: Endangered elements in the periodic table. Questions that may be explored in this investigation include:</p> <ul style="list-style-type: none"><li>• Which chemicals are used in the manufacture of fireworks, what is the environmental impact of the combustion of these chemicals to produce the colourful effects seen in fireworks displays, and what alternatives are available?</li><li>• Based on their usefulness for society, how would you compare the value of lanthanoids and actinoids with the value of other metal groups in the periodic table?</li><li>• Why is helium classified as a critical and endangered element, and how can it be saved given that its atmospheric recovery is almost impossible?</li><li>• How do the properties of the metalloids (such as germanium, antimony, tellurium) differ so much to their neighbours on the periodic table, and how have these properties made them highly important for society and consequentially scarce in supply?</li></ul>
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