

# Progression map: Chemistry



On our progression maps “→” indicates conceptual knowledge that a unit builds upon. This should be checked and consolidated before and during the teaching of new content. “+” indicates conceptual knowledge that is developed during the topic. To aid the development of students scheme we have organised our progression mapping around our five “big questions” for chemistry.

Unit	What are substances?	What gives substances their properties?	What is chemical change?	How does chemistry affect our world?	What is the Earth made of and how is it changing?
<b>Year 7</b>					
C1: Substances and mixtures	<p><b>(KS2, Y4)</b> → Materials can be in three states. The physical properties of ‘solids, liquids &amp; gases’ (eg liquids flow)</p> <p><b>(KS2, Y4)</b> → Materials have properties (including solubility) and can change state (State changes boiling, melting, freezing)</p> <p><b>(KS2, Y5)</b> → Separation techniques (filtering and evaporation)</p>				
	<p>+ Chemistry is the study of substances. Single substances can exist in all three states of matter</p> <p>+ Materials can be single substances or mixtures of substances</p> <p>+ Single substances start and finish changing state at the same temperature. (melting point)</p> <p>+ solutions are mixtures</p> <p>+ Mixtures of substances can be separated using separation techniques: filtering, crystallization, chromatography and distillation</p>	<p>+ Properties of “states of matter” explained by particle model</p> <p>+ Changes of state can be explained using the energy of particles and their hold on each other</p>			
C2: Substances	<p><b>C1</b> → Chemistry is the study of Substances. Single substances can exist in all three states of matter</p> <p><b>C1</b> → Single substances start and finish changing state at the same temperature. (melting point)</p>	<p><b>C1</b> → Properties of “states of matter” explained by particle model</p> <p><b>C1</b> → Changes of state can be explained using energy of particles and their hold on each other</p>	<p><b>(KS2, Y5)</b> → Some changes form new materials.</p> <p><b>(KS2, Y5)</b> → Changes that form new materials are usually irreversible.</p> <p><b>(KS2, Y5), C1</b> → Mixtures can be separated into single substances.</p>		
	<p>+ Single substances made of only one type of atom are called elements</p> <p>+ Elements are classified by their properties as metals or non-metals</p> <p>+ Substances made of more than one type of atom joined together are called compounds</p> <p>+ Compounds have new properties.</p> <p>+ All substances are represented by a chemical formula</p>	<p>+ Metals have a “giant structure” where all atoms have strong holding power</p> <p>+ Substances with giant structures have high melting points</p> <p>+ The atoms in non-metal elements are arranged in molecules (atoms held strongly in small groups)</p> <p>+ Molecules only have a weak hold on each other, so non-metals have low melting points</p>	<p>+ Chemical changes form new substances</p> <p>+ New substances produced have different properties from the substances reacted</p> <p>+ Physical changes (eg mixing and dissolving) does not produce new substances</p>		

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C3: Solubility	<p><b>C1</b> → Single substances have melting and boiling points</p> <p><b>C1</b> → Substances have their own properties</p> <p><b>C1</b> → The state of matter of a substance depends on temperature</p> <p><b>C1</b> → Solutions as mixtures</p>	<p><b>C1, C2</b> → Properties of “states of matter” explained by particle model</p> <p><b>C1, C2</b> → Changes of state can be explained using energy of particles and their hold on each other</p>			
	<p>+ Solubility is a property of single substances measured in g/cm<sup>3</sup></p> <p>+ The solubility of a substance depends on temperature</p>	<p>+ Solubility can be explained by the movement of particles in a liquid and the “hold” between solvent and solute particles</p>			
C4: Introducing chemical reactions	<p><b>C2</b> → All substances are represented by a chemical formula</p> <p><b>C2</b> → That formulas can be represented as ‘circle diagrams</p> <p><b>C3</b> → Solubility is a property of single substances</p>		<p><b>C2</b> → Chemical changes form new substances</p> <p><b>C2</b> → New substances produced have different properties from the substances reacted</p> <p><b>C2</b> → Physical changes do not produce new substances</p>		
	<p>+ The state of matter of a substance can be represented by symbols (s, l, g or aq)</p>		<p>+ The symbol for chemical change is an arrow</p> <p>+ Chemical change can be represented by word or symbol equations</p> <p>+ Chemical changes rearrange atoms</p> <p>+ Mass is conserved in chemical changes</p>		

**Year 8**

C5a: How is our planet changing?	<p><b>C2</b> → All substances are represented by a chemical formula</p> <p><b>C2</b> → Substances can be giant or molecular</p>	<p><b>C1, C2</b> → Properties of “states of matter” explained by particle model</p> <p><b>C1, C2</b> → Changes of state can be explained using energy of particles and their hold on each other</p>			<p><b>P4</b> → The earth is a spherical planet (<b>KS2 , Y3</b>) → Rocks can be grouped on basis of appearance and physical properties (hardness)</p>
	<p>+ Crystals are made of single substances with a giant structure</p>	<p>+ Minerals have high melting points because they have giant structures</p>			<p>+ Igneous, sedimentary &amp; metamorphic rocks are mixtures of minerals</p> <p>+ Rocks can be classified into three types by their structure</p> <p>+ formation of igneous &amp; metamorphic rocks</p> <p>+ The geosphere has a crust, mantal, inner and outer core</p> <p>+ Temperature increases with depth</p> <p>+ The surface of the earth is divided into moving tectonic plates</p>

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C6: What types of chemical reaction are there?	<p><b>C2</b> → That all chemical substances have their own formula</p> <p><b>C2</b> → That formulas can be represented as ‘circle diagrams’</p>		<p><b>C2, C4</b> → Chemical changes form new substances</p> <p><b>C2, C4</b> → New substances produced have different properties from the substances reacted</p> <p><b>C2, C4</b> → That atoms are rearranged during chemical changes</p> <p><b>C2, C4</b> → That chemical changes can be represented by word and symbol equations</p>		
			<p>+ That chemical changes can be grouped into “types of reaction”</p> <p>+ Oxidation reactions add oxygen atoms to a substance &amp; Combustion reactions are a type of oxidation reaction</p> <p>+ That mass is conserved in thermal decomposition reactions</p> <p>+ What displacement reactions are</p>		
C7: What are the atmosphere and hydrosphere?	<p><b>C1</b> → That most materials are mixtures of substances</p> <p><b>C1</b> → That all substances can exist in different states of matter</p> <p><b>C1</b> → The state of matter of a substance depends on temperature</p> <p><b>C1</b> → A substance will only boil at its boiling point</p>		<p><b>C2, C4, C6</b>→ Chemical changes form new substances</p> <p><b>C2, C4, C6</b>→ New substances produced have different properties from the substances reacted</p>	<p><b>(KS2, Y4)</b> → Clouds form by evaporation and condensation as part of the water cycle</p>	<p><b>C5a</b>→ The geosphere is made of minerals</p> <p><b>C5a</b>→ The crust is made of mixtures of minerals called rocks</p>
	<p>+ A substance in its liquid state will evaporate at any temperature</p>	<p>+ A particle model of evaporation</p>		<p>+ The atmosphere is the layer of gas around the Earth. Air is a mixture</p> <p>+ The hydrosphere is all the water on earth (fresh, salt and vapor)</p> <p>+ Water on Earth is constantly cycling in an earth wide system</p> <p>+ detail of cloud formation</p> <p>+ Human activity is polluting our atmosphere</p>	
C8: How is energy transferred in chemical reactions?			<p><b>P1</b> → Systems store energy in different stores</p> <p><b>Physics</b> → Difference between temperature &amp; thermal store</p> <p><b>P1</b> → That atoms are rearranged during chemical changes</p> <p><b>P1</b> → Chemical changes form new substances</p>		
			<p>+ Most reactions are exothermic and transfer energy to the surroundings</p> <p>+ Some reactions are endothermic and take in energy from their surroundings</p>		

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C9: How do acids react?	C1, C2 → Solutions have the properties of the substances they are made of		C2, C4, C6 → Chemical changes form new substances C2, C4, C6 → New substances produced have different properties from the substances reacted C2, C4, C6 → That atoms are rearranged during chemical changes C2, C4, C6 → That chemical changes can be represented by word and symbol equations	C8 → air is a mixture of substances C8 → Water on Earth is constantly cycling in an earth wide system C8 → Clouds form by evaporation and condensation C8 → Human activity is polluting our atmosphere	
	+ Solutions can be acidic or alkaline + Acidity is measured on pH scale		+ Neutralisation reactions form a salt and water + acids react with metals to form a salt and hydrogen.	+ pollution can cause acid rain which reacts with minerals in rocks	
C5b: How is our planet changing?	C5a → Minerals are crystals made of single substances with a giant structure C9 → Solutions can be acidic or alkaline C9 → Acidity is measured on pH scale		C9 → Neutralisation reactions form a salt and water C2, C4 → Chemical changes produce new substances but physical changes do not	C7 → Water on Earth is constantly cycling in an earth wide system	C5a → Igneous, sedimentary & metamorphic rocks are mixtures of minerals C5a → Rocks can be classified into three types by their structure
				+ Acidity of natural rainwater + reaction of (carbonate) rocks with rainwater	+ The surface of the earth is constantly changing + Physical weathering + Chemical weathering + formation of sedimentary rocks + Formation of crude oil in sedimentary rocks