

At-a-glance unit content, assessment criteria and guidance

To help you with assignment writing as well as assessing assignments, this table maps the Unit 2 content against the Unit 2 assessment criteria and assessment guidance, taken from the specification. For further advice and help on writing and assessing assignments please contact TeachingScience@pearson.com.

Unit 2 Learning Aim A – Investigate chemical reactivity and bonding

Unit content	Assessment criteria	Assessment guidance
A.1 Chemical and physical properties of groups 1 and 7 of the periodic table: <ul style="list-style-type: none"> a. trends in physical properties of groups 1 and 7 (appearance, melting point, boiling point, electrical conductivity) b. reactivity with water for group 1 c. displacement reactions for group 7 d. trends in chemical properties in group 1 and group 7 – relationship with electronic configuration. 	1A.1 Classify group 1 and 7 elements based on their physical properties.	For 1A.1 , learners must classify and categorise at least two elements from group 1 and at least two elements from group 7 based on their physical properties (e.g. boiling point, melting point, electrical conductivity, thermal conductivity, solubility in water and non-polar solvents, viscosity).
	2A.P1 Describe the physical and chemical properties of group 1 and 7 elements.	For 2A.P1 , learners must build on their evidence for 1A.1 by describing the physical and chemical properties of the group 1 and 7 elements.
	2A.M1 Describe trends in the physical and chemical properties of group 1 and 7 elements.	For 2A.M1 , learners must describe one physical trend and one chemical trend for each group. For example, learners could describe the change in boiling point and displacement reactions for group 7 elements, and the change in melting point and chemical reactivity of group 1 elements with water.
	2A.D1 Explain the trends in chemical properties of group 1 and 7 elements in terms of electronic structure.	For 2A.D1 , learners should explain the trend in chemical properties that they have described for 2A.M1 using their understanding of electronic structure.

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<p>A.2 Bonding and structure: a. formulae of molecules (in A.2b and A.2c) b. covalent bonding (hydrogen, chlorine, carbon dioxide, methane, water, oxygen) c. ionic bonding (sodium chloride, magnesium oxide, magnesium chloride) d. properties of simple covalent, giant covalent and ionic materials.</p>	<p>1A.2 Describe properties of ionic and covalent substances.</p>	<p>For 1A.2, learners must describe four typical properties of ionic substances and four typical properties of covalent substances.</p>
	<p>2A.P2 Compare properties of ionic and covalent substances.</p>	<p>For 2A.P2, learners should build on their evidence for 1A.2 by comparing the properties identified.</p>
	<p>2A.M2 Explain the properties of ionic and covalent substances.</p>	<p>For 2A.M2, learners must explain the properties identified in 1A.2 and 2A.P2 in terms of the bonding and structure of ionic and covalent substances.</p>
	<p>1A.3 Classify substances as ionic or covalent</p>	<p>For 1A.3, from data provided or through practical investigation, learners must classify at least six different substances as being either covalent or ionic in nature.</p>
	<p>2A.P3 Draw dot-and-cross diagrams of simple ionic and covalent substances.</p>	<p>For 2A.P3, learners must draw dot-and-cross diagrams for all substances listed in the unit content for learning aim A, topics A.2b and A.2c as a minimum.</p>
	<p>2A.M3 Describe the formation of ionic and covalent substances.</p>	<p>For 2A.M3, learners could use their diagrams for 2A.P3 to describe how ions, molecules and chemical bonds are formed.</p>
	<p>2A.D2 Relate applications of compounds to their properties and to their bonding and structure.</p>	<p>For 2A.D2, learners must give three examples of substances (one giant ionic, one giant molecular and one simple molecular) and relate their properties to their bonding and structure. Learners could give examples of the applications of these substances that demonstrate a reliance on these properties.</p>

Unit 2 Learning Aim B – Investigate how uses of chemical substances depend on their chemical and physical properties

Unit content	Assessment criteria	Assessment guidance
<p>B.1 Use of chemicals based on their physical properties:</p> <ul style="list-style-type: none"> a. electrical conductivity b. thermal conductivity c. melting and boiling points d. solubility in different solvents e. viscosity. <p>B.2 Use of chemicals based on their chemical properties:</p> <ul style="list-style-type: none"> a. sodium azide in airbags b. argon in welding c. silicon in computer–chip technology d. carbon dioxide in fire extinguishers. 	<p>1B.4 Describe physical properties of chemical substances.</p>	<p>For 1B.4, learners could discuss the different types of physical properties of some common chemical substances. They must give brief descriptions of these properties.</p>
	<p>2B.P4 Describe how chemical substances are used based on their physical properties.</p>	<p>For 2B.P4, learners must link the use of chemical substances to their physical properties and must describe at least two examples.</p>
	<p>1B.5 Describe chemical properties of chemical substances.</p>	<p>For 1B.5, this could be covered by giving learners access to secondary data or research, or they could carry out practical work looking at a variety of chemical changes involving common chemical substances. They must classify at least two changes that are chemical (e.g. interaction with water).</p>
	<p>2B.P5 Describe how chemical substances are used based on their chemical properties.</p>	<p>For 2B.P5, learners must list some common useful chemical products. They may produce a leaflet or poster to do this. They must identify the properties that make these products useful and must link the use of these chemical substances to their chemical properties. They must describe at least two examples.</p>
	<p>2B.M4 Explain how physical and chemical properties of chemical substances make them suitable for</p>	<p>For 2B.M4, learners could investigate, for example, the physical and chemical properties of substances related to an industry (e.g. cement or plaster in construction) or a use (e.g.</p>

	their uses.	mobile phones). Learners could carry out simple comparisons of data for thermal or electrical conductivity, melting point or boiling point and solubilities. They could identify trends in the data and make predictions for chemicals with similar physical properties. Learners could also be given the boiling points of different chemicals and predict their state at room temperature and when under pressure, e.g. the separate fractions obtained from the fractional distillation of crude oil. At least three chemical substances must be studied.
	2B.D3 Assess the suitability of different types of substance for a specified use.	For 2B.D3 , learners can be given a range of chemical substances and must assess them for a specified use. They could pick the most appropriate chemical substance for several specified uses. They must explain why the chemical substances are most appropriate for the specified use, in terms of physical and chemical properties. They must look at each property in turn and explain why the property makes it appropriate or inappropriate for the specified use. Learners must then explain why the overall properties make it the most appropriate chemical substance.

Unit 2 Learning Aim C – Investigate the factors involved in the rate of chemical reactions

Unit content	Assessment criteria	Assessment guidance
C.2 Reaction rates: a. effect of catalysts (lowering the energy needed for a	1C.6 Identify the factors that can affect the rates of chemical reactions.	For 1C.6 , learners could discuss the factors that can affect the rate of a reaction, to establish what the possible factors could be. They may do this after carrying out some practical

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reaction to occur), surface area, concentration and temperature on rate of reaction b. use of reaction rate graphs c. collision theory.		investigations. This could be reported in the form of a table.
	2C.P6 Describe the factors that can affect the rates of chemical reactions.	For 2C.P6 , learners must describe these factors. Learners must cover the effects of concentration, particle size, temperature and presence of a catalyst on the rates of chemical reactions, and show that, for example, increasing temperature increases the rate of reaction.
	2C.M5 Explain how different factors affect the rate of industrial reactions.	For 2C.M5 , learners should explain how changing the rates of reactions affects certain industrial processes.
C.1 Equations: a. word equations b. simple balanced equations (including state symbols: (s), (l), (g), (aq)) c. recognise reactants and products in a reaction (displacement, combustion, neutralisation reactions) d. reversible and irreversible chemical change.	1C.7 Identify reactants and products, including state symbols in chemical equations, and whether reactions are reversible or irreversible.	For 1C.7 , learners can be given at least three balanced chemical equations. They must identify the reactants and the products in each of these equations, to include their symbols, state and if the reaction is reversible.
	2C.P7 Identify the number and types of atoms in balanced chemical equations.	For 2C.P7 , they must identify the number and types of atoms in these equations.
C.3 Industrial processes: a. the concept of yield (mass of product obtained) and that the actual yield is less than the theoretical yield b. altering rates of reaction c. atom economy.	2C.M6 Explain the terms 'yield' and 'atom economy' in relation to specific chemical reactions.	For 2C.M6 , they must explain the terms 'atom economy' and 'yield' in relation to at least one of these three equations.
	2C.D4 Analyse how different factors affect the rate and yield of an industrial reaction.	For 2C.D4 , learners should include an analysis of how different factors affect the rate and yield of an industrial reaction. This should include information on the operating conditions used in industry for the reaction.

Unit 2 Learning Aim D – Understand the factors that are affecting the Earth and its environment

Unit content	Assessment criteria	Assessment guidance
D.2 Human activity factors: a. obtaining materials from the sea, land and air, e.g. coal, natural gas, oil, metal ores, salt, nitrogen, oxygen b. production of useful materials from their natural sources c. effects on the environment (local and global effects) d. effects of chemical processing (energy factors, health and safety, disposal).	1D.8 Identify the human activities that affect the Earth and its environment	For 1D.8 , learners must identify at least two human activities that have environmental consequences, as outlined in the content.
	2D.P8 Describe the human activities that affect the Earth and its environment.	For 2D.P8 , they must describe the effects of the activities identified in 1D.8.
D.1 Natural activity factors (tectonic plates and volcanic eruptions) influencing: a. the Earth's crust b. the evolution of the atmosphere and oceans.	1D.9 Identify natural factors that have changed the surface and atmosphere of the Earth.	For 1D.9 , learners must identify at least two natural factors, for example, volcanic eruption or movement of tectonic plates.
	2D.P9 Describe natural factors that have changed the surface and atmosphere of the Earth.	For 2D.P9 , learners must describe the two factors identified for 1D.9.
D.3 Sustainable development issues:	2D.M7 Discuss the extent to which human activity has changed the environment, in comparison to	For 2D.M7 , learners must discuss how humans may exercise choices that could limit or worsen the effects of the environmental damage they cause. This could be in relation

<p>a. human choices (recycling, use of fossil fuels versus nuclear fission fuels)</p> <p>b. human solutions (renewable energy, biofuels (ethanol), nuclear fusion).</p>	<p>natural activity.</p>	<p>to the <i>two activities identified in 1D.8</i>. Learners must also discuss how natural factors have changed the atmosphere and surface of the Earth. This could be limited to a specific volcanic eruption or a clash of tectonic plates. Learners must consider the effects of several events, like those identified in 1D.9, which have happened over millions of years.</p>
	<p>2D.D5 Evaluate possible solutions to changes in the environment, occurring from natural or human activity.</p>	<p>To achieve 2D.D5, learners should explain how the effects of at least two environmentally damaging natural or human activities may be reduced by evaluating possible solutions. This may be in relation to the activities identified in 1D.8 and/or the factors identified in 1D.9.</p>