



GCSE MARKING SCHEME

SUMMER 2025

**GCSE
SCIENCE (DOUBLE AWARD) – UNIT 2**

3430U20-1 AND 3430UB0-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCSE SCIENCE (DOUBLE AWARD) UNIT 2
CHEMICAL BONDING, APPLICATION OF CHEMICAL REACTIONS AND ORGANIC CHEMISTRY
SUMMER 2025 MARK SCHEME

GENERAL INSTRUCTIONS

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	=	correct answer only
ecf	=	error carried forward
bod	=	benefit of doubt

FOUNDATION TIER ONLY QUESTIONS

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		nucleus	1			1		
		(ii)		negative	1			1		
	(b)			C (1) E (1) D (1)		3		3		
				Question 1 total	2	3	0	5	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			X ⇒ filter funnel (1) Y ⇒ Bunsen burner (1)	2			2		2
	(b)	(i)		it decomposes ☐ it is soluble ☒ it evaporates ☐		1		1		
		(ii)		filtration (1) evaporation (1)	2			2		2
				Question 2 total	4	1	0	5	0	4

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	award (2) for all three bars correctly drawn award (1) for any one or two bars correctly drawn mark height only – tolerance $\pm\frac{1}{2}$ small square		2		2	2	
		(ii)	B is the hardest sample (1) must identify the correct sample to access the second mark it produces the least amount of froth/lather/bubbles (with soap solution) (1) accept 'it has the lowest bar' neutral answers it only produces 7mm of froth not much froth least reaction with soap do not accept any reference to the volume of soap added		2		2		2
	(b)		wastes soap ☐ strengthens bones and teeth ☒ forms fur in kettles ☐ cleans pipes ☐	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			add limescale ☐ add fluoride ☐ add washing soda ☒	1			1		
	(d)			CaCl ₂		1		1		
				Question 3 total	2	5	0	7	2	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		award (2) for all six points plotted correctly (ignore point at 0,0) award (1) for any four or five points plotted correctly - tolerance $\pm\frac{1}{2}$ small square award (1) for good attempt at smooth curve from 0,0		2	1	3	3	3
		(ii)		between 4 and 5 minutes ☒ between 3 and 4 minutes ☐ between 5 and 6 minutes ☐			1	1		
	(b)			less (1) more (1) increases (1)	3			3		
	(c)			161 (2) if incorrect award (1) for any clear indication of the number of each atom present in the formula e.g. (1 $\times$ Zn) and (1 $\times$ S) and (4 $\times$ O) 65 + 32 + (4 $\times$ 16) 65 + 32 + 64		2		2	2	
				Question 4 total	3	4	2	9	5	3

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	1 mg/l chlorine takes 40 minutes longer to kill bacteria than 2 mg/l chlorine ☐						
			2 mg/l chlorine takes 30 minutes longer to kill bacteria than 3 mg/l chlorine ☐						
			3 mg/l chlorine takes 20 minutes longer to kill bacteria than 4 mg/l chlorine ☐			1	1		
			4 mg/l chlorine takes 10 minutes longer to kill bacteria than 5 mg/l chlorine ☒						
		(ii)	award (1) for either of following - it takes the <u>same time</u> (30 minutes) (to kill bacteria as 5mg/l chlorine) - it makes no difference to the <u>time</u> taken (to kill bacteria) neutral answer – it makes no difference / gives the same result			1	1		
		(iii)	6000mg ☒ 6500mg ☐ 7000mg ☐ 7500mg ☐			1	1	1	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		$\boxed{2} \text{ Na} + \text{Cl}_2 \longrightarrow \boxed{2} \text{ NaCl}$		1		1		
		(ii)		80.3% / 80% (2) if incorrect award (1) for either of following $\frac{9.4}{11.7}$ 0.803 / 0.80 no ecf possible e.g. if 7.1 used in the calculation		2		2	2	
				Question 5 total	0	3	3	6	3	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				Indicative content - the Earth cooled so water vapour condensed to form the oceans - there was no oxygen to begin with - green plants evolved and started to photosynthesise – this decreased carbon dioxide levels and introduced oxygen into the atmosphere - carbon dioxide absorbed by the oceans - some carbon dioxide was absorbed by the shells of marine organisms which eventually formed sedimentary rock / limestone - some carbon dioxide became locked in fossil fuels - these processes took millions of years - current atmosphere consists of 21% oxygen, 0.04% carbon dioxide (along with 78% nitrogen and 0.9% argon) 5-6 marks Accurate description of the key steps and their effect on levels of each of the three gases <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i> 3-4 marks Description of some of the key steps and/or their effect on levels of more than one of the gases <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i> 1-2 marks Reference to one of the key steps and/or the effect on the level of one of the gases <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>	6			6		
				Question 6 total	6	0	0	6	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	award (1) for any of following • (both) float on water • (both) move on the surface of the water • (both) produce bubbles of gas / effervescence neutral answers – reference to products formed do not accept melts into a ball ignites / lilac flame	1			1		1
		(ii)	award (1) for any of following • potassium ignites (whilst lithium does not) • potassium gives a lilac flame (whilst lithium does not ignite) • potassium moves faster on the surface of the water (than lithium does) • potassium produces more bubbles of gas (than lithium does) accept any implication of a difference even if it is not clear which metal is the more reactive e.g. • they move at different speeds on the surface of the water • one produces more bubbles of gas than the other	1			1		1
	(b)	(i)	$2\text{K} + \boxed{2} \text{H}_2\text{O} \longrightarrow 2 \text{KOH} + \text{H}_2$ award (1) for product formula award (1) for balancing balancing mark can only be awarded if formula is correct		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		purple / (dark / navy) blue		1		1		1
	(c)			(squeaky) pop noise	1			1		1
	(d)			same reactivity as potassium ☐ more reactive than potassium ☒ less reactive than potassium ☐		1		1		1
				Question 7 total	3	4	0	7	0	5

COMMON QUESTIONS

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/1	(a)	(i)		award (1) for any value in the range 0.68-0.74		1		1	1	1
		(ii)		no credit to be award if there is any suggestion that athlete A and/or athlete D have taken either substance B has taken testosterone (1) C has taken nandrolone (1) if neither of the first two marks credited award (1) for B and C have taken steroids A and D have taken neither substance / have not taken steroids (1)			3	3		3
	(b)			award (1) each for any two of following - ethanol / it has a lower boiling point (than water) - ethanol / it {boils/evaporates} first no credit for 'evaporates quicker' - vapour {leaves flask/goes into condenser} and {is cooled (to become a liquid)/condenses} OR vapour {cools/condenses} and goes into the flask/beaker if no other credit award (1) for 'they have different boiling points'	1		1	2		2
				Question 8/1 total	1	1	4	6	1	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9/2	(a)			award (1) for any sensible answer that describes insoluble materials/particles being removed from water e.g. • mud sinks to the bottom • sand particles are removed neutral answer – bacteria do not accept reference to molecules or anything that floats e.g. twigs	1			1		
	(b)			chlorine (1) must identify chlorine to access the second mark award (1) for either of following kills bacteria / microorganisms disinfects / sterilises the water neutral answers gets rid of bacteria cleans the water	2			2		
				Question 9/2 total	3	0	0	3	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10/3	(a)	(i)		X Na^+ (1) white precipitate (1) Y lilac flame seen (1)			3	3		3
		(ii)		potassium iodide neutral answer – KI		1		1		
	(b)			award (1) for each correct formula (either order) AgBr LiNO_3		2		2		
				Question 10/3 total	0	3	3	6	0	3

HIGHER TIER ONLY QUESTIONS

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		C		1		1		
		(ii)		B		1		1		
	(b)			10 electrons (1) 10 neutrons (1)		2		2		
	(c)			$2\text{Fe} + \boxed{3} \text{F}_2 \longrightarrow \boxed{2} \text{FeF}_3$ award (1) for product formula award (1) for balancing balancing mark can only be awarded if formula is correct		2		2		
				Question 4 total	0	6	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			catalysts increase the rate / speed of a reaction (1) award (1) for either of following - lower the activation energy - lower the energy needed for a collision to be successful accept lower the energy needed for a reaction to take place neutral answer - provide an alternative pathway	2			2		2
	(b)	(i)		award (1) for all five points plotted correctly – tolerance ±1 small square award (1) for smooth curve through the points		2		2	2	
		(ii)		award (1) for simple description e.g. as the mass of starch increases the time for the bouncy ball to harden decreases award (1) for additional detail e.g. after 0.5 g is added there is no further decrease in time / time stays the same award (2) marks for either of following - the decrease in time gets smaller as more starch is added - time decreases at a decreasing rate neutral answer – time taken for the bouncy ball to harden decreases over time			2	2		2
	(c)			award (1) for any of following - bouncy balls will harden more quickly / at a higher rate - bouncy balls will harden in less time - reaction will be faster		1		1		1
				Question 5 total	2	3	2	7	2	5

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		award (1) for either of following - fossil remains of Cynognathus and Glossopteris found on both continents - similar fossils found on both continents do not accept reference to countries continents must have been joined together (many millions of years ago) (1)	2			2		
		(ii)		because they lived in the ocean they could move freely from one side to the other do not accept reference to fossils moving neutral answer – their fossils would be in the ocean and he would not be able to find them			1	1		
		(iii)		award (1) for any of following - different continents could fit like a jigsaw puzzle accept 'coastlines' - similar rock formations found on different continents - glacial striations near the equator - coal can be found in polar regions do not accept reference to countries	1			1		
	(b)			(tectonic) plates move towards each other (1) award (2) for any two linked points e.g. the denser/oceanic plate is pushed downwards ⇒ rock melts to form magma / volcanoes the denser/oceanic plate is pushed downwards ⇒ earthquakes occur the less dense/continental plate is pushed upwards ⇒ mountains / volcanoes form / earthquakes occur if no linked points award (1) for any listed above	3			3		
				Question 6 total	6	0	1	7	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			adding a catalyst does not affect the amount of reactants or products ☒ adding a catalyst increases the amount of products ☐ adding a catalyst increases the amount of reactants ☐ increasing the pressure increases the amount of products ☒ increasing the pressure increases the amount of reactants ☐ increasing the temperature increases the amount of products ☐ increasing the temperature increases the amount of reactants ☒ award (1) for each correct tick		3		3		
	(b)			(at higher concentration) there are more particles in the same volume (1) award (1) for any of following • more successful collisions • more collisions per second • higher frequency/more chance of collisions do not accept any reference to increase in energy	2			2		
				Question 7 total	2	3	0	5	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8				award (1) for any of following - the number of electron shells increases (on going down the group) - atoms get larger (on going down the group) - the outermost electron gets further from the nucleus (on going down the group) there is less attraction between the outermost electron and the nucleus (1) so the electron is more easily lost (1)	3			3		
				Question 8 total	3	0	0	3	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)			limescale / precipitate / solid forms (on the heating element) (1) award (1) for any of following - transfer of heat is less efficient - it takes longer for the kettle to boil - more energy/electricity needed for the kettle to boil			2	2		2
	(b)	(i)		award (1) for either of following - magnesium/calcium <u>ions</u> swap places with sodium <u>ions</u> $\text{Mg}^{2+}/\text{Ca}^{2+}$ swap places with Na^+ accept replace / change places with / exchange with do not accept 'displace'	1			1		
		(ii)		award (1) for either of following - the resin beads run out of sodium ions - the column has to be regenerated by adding sodium ions / with sodium chloride solution / with salt solution - sodium ions can increase blood pressure / can cause heart disease neutral answer – reference to cost	1			1		
	(c)			3.0 g (2) if incorrect award (1) for either of following mass = number of moles $\times M_r$ mass = 0.025×120	1	1		2	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			award (1) for each correct formula CaCO ₃ Na ₂ SO ₄ accept formulae in either order		2		2		
				Question 9 total	3	3	2	8	2	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			Indicative content - order of reactivity decreases down the group ⇒ chlorine > bromine > iodine - more reactive Group 7 element can displace a less reactive Group 7 element from its compounds - chlorine displaces bromine and iodine from their compounds - bromine displaces iodine from its compounds $\text{Cl}_2 + 2\text{NaBr} \rightarrow 2\text{NaCl} + \text{Br}_2$ $\text{Cl}_2 + 2\text{NaI} \rightarrow 2\text{NaCl} + \text{I}_2$ $\text{Br}_2 + 2\text{NaI} \rightarrow 2\text{NaBr} + \text{I}_2$ (credit word equations) 5-6 marks Correct order of reactivity with clear reasoning in terms of displacement reactions taking place; correct word/symbol equation <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i> 3-4 marks Correct order of reactivity; attempt at explanation in terms of displacement reactions; attempt at word equation <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i> 1-2 marks Chlorine most reactive/iodine least reactive; simple reference to the number of reactions for each halogen <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>	4	2		6		2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			$\frac{3.36}{56} : \frac{6.39}{35.5} \quad (1)$ $0.06 : 0.18 \Rightarrow 1 : 3 \quad (1)$ $\text{FeCl}_3 \quad (1)$ ecf possible award (2) for Fe_3Cl (where A_r divided by mass) award (1) only for FeCl_3 with no working		3		3	3	
				Question 10 total	4	5	0	9	3	2

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	3	0	5	0	0
2	4	1	0	5	0	4
3	2	5	0	7	2	2
4	3	4	2	9	5	3
5	0	3	3	6	3	0
6	6	0	0	6	0	0
7	3	4	0	7	0	5
8	1	1	4	6	1	6
9	3	0	0	3	0	0
10	0	3	3	6	0	3
TOTAL	24	24	12	60	11	23

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	1	4	6	1	6
2	3	0	0	3	0	0
3	0	3	3	6	0	3
4	0	6	0	6	0	0
5	2	3	2	7	2	5
6	6	0	1	7	0	0
7	2	3	0	5	0	0
8	3	0	0	3	0	0
9	3	3	2	8	2	2
10	4	5	0	9	3	2
TOTAL	24	24	12	60	8	18