



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
CHEMISTRY – COMPONENT 1**

**C410U10-1
C410UA0-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE CHEMISTRY COMPONENT 1: Concepts in Chemistry

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

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	<i>(a)</i>			beaker (1)							
				filter paper (1) do not accept filter funnel / filter							
				evaporating basin (1) accept basin	3			3		3	
		<i>(b)</i>		carbon dioxide	1			1		1	
		<i>(c)</i>		award (1) for any of following <ul style="list-style-type: none"> • bubbling stops / fizzing stops / no bubbling • solid remains / solid left on bottom / excess solid / copper(II) carbonate remains 	1			1		1	
	<i>(d)</i>		evaporation	1			1		1		
	<i>(e)</i>		ZnCl ₂		1		1				
			Question 1 total	6	1	0	7	0	6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		oil (1) water (1) chlorine (1)	3			3		3
		(ii)		red	1			1		1
	(b)			Li ₂ O		1		1		
				Question 2 total	4	1	0	5	0	4

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			award (1) for each correct sentence protons and neutrons both needed, either order protons and electrons both needed, either order 4 9 (2,2)	5			5		
	(b)			bigger than	1			1		
	(c)			69 (2) if answer incorrect award (1) for any indication that formula contains one beryllium atom, one carbon atom and three oxygen atoms e.g. $9 + 12 + 48$		2		2	2	
				Question 3 total	6	2	0	8	2	0

Question				Marking details		Marks available					
						AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		oxygen	accept O / O ₂		1		1		
		(ii)		mercury	accept Hg		1		1		
		(iii)		44			1		1		
	(b)	(i)		70			1		1		
		(ii)		gas	do not accept vapour		1		1		
	(c)			change thermometer (1)	accept melting point apparatus						
				award (1) for any of following reasons							
				• needs a scale up to (at least) 120°C							
				• needs a higher maximum temperature							
				• because it only goes up to 110°C							
				change water / use oil / use liquid paraffin (1)							
				award (1) for either of following reasons							
				• need a liquid which boils above 100°C							
				• because water can only reach 100°C							
				• because benzoic acid would not melt in water at 100°C				4	4		4
				Question 4 total		0	5	4	9	0	4

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	I	Fe ³⁺		1		1		
			II	Fe ₂ O ₃		1		1		
		(ii)		17 / 17.4 / 17.39 (3) if answer incorrect award (2) for $\frac{1.6}{9.2}$ award (1) for 1.6 or for alternative method award (2) for 100 – 82.6 award (1) for $\frac{7.6}{9.2}$		3		3	3	3
		(iii)		leave the experiment until the water level in the tube stops rising			1	1		1
	(b)	(i)		award (2) for all three bars plotted correctly award (1) for any two bars plotted correctly		2		2	2	2
		(ii)		grease			1	1		1
Question 5 total					0	7	2	9	5	7


Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)		award (2) for correctly balanced equation $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ if incorrect award (1) for correct products $\text{H}_2\text{O} + \text{O}_2$ both needed, either order		2		2		
	(b)		all points plotted correctly (1) tolerance $\pm\frac{1}{2}$ square smooth curve from (0,0) through all points (1)		2		2	2	2
	(c)	(i)	32 ECF possible from curve drawn	1			1	1	1
		(ii)	80 ECF possible from curve drawn		1		1	1	1
	(d)		curve to left of plotted graph (1) curve starts at (0,0) and levels off at 50 cm^3 ($\pm\frac{1}{2}$ square) (1)	1		1	2		2
	(e)		a catalyst lowers the minimum energy required for successful collisions	1			1		
			Question 6 total	3	5	1	9	4	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			award (1) for either of following <ul style="list-style-type: none"> nano-sized titanium dioxide / it is transparent nano-sized titanium / it reacts with dirt 	1			1		
	(b)			15 nm 15 mm 15 m		1		1	1	
	(c)			nano-sized titanium dioxide breaks down dirt when exposed to UV light (1) nano-sized titanium dioxide prevents the formation of water droplets (1)			2	2		
	(d)			(less detergent) pollutes water / rivers / lakes / water supplies	1			1		
				Question 7 total	2	1	2	5	1	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)	diamond hard (1) drill bits (1) graphite electrical conductor (1) electrodes (1)	4			4		
		(ii)	covalent	1			1		
		(iii)	10^{-9}	1			1		
	(b)		award (3) for all six correct lines award (2) for any four correct lines award (1) for any two correct lines <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">sodium</div> <div style="border: 1px solid black; padding: 2px;">ammonia</div> <div style="border: 1px solid black; padding: 2px;">sodium chloride</div> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> </div>	3			3		
Question 8 total				9	0	0	9	0	0

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
9	(a)	<p>Indicative content</p> <ul style="list-style-type: none"> • same volume of water and flask / can • same distance between flame and flask / can • record mass of burner before heating • heat to obtain the same temperature rise • record mass of burner after heating • fuel A uses less mass than B therefore releases more energy per gram <p>alternative method involves burning equal masses of both fuels and recording the temperature rise; fuel A gives greater temperature rise</p> <p>ignore any calculations using hypothetical values and equation from part (b)</p> <p>5-6 marks Good description of fair test and correct result predicted <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></p> <p>3-4 marks Most elements of a fair test included and attempt to predict result <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></p> <p>1-2 marks Attempt at fair test and/or result <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></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>	3	3		6		6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(b)			2000 (2) if answer incorrect award (1) for temperature change of 80		2		2	2	2
				Question 9 total	3	5	0	8	2	8

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)	(i)		alkanes	1			1		
		(ii)		as the number of carbon atoms increases, the boiling point increases			1	1		
	(b)			 <p style="text-align: center;">both water molecules needed</p>		2		2		
	(c)			C_8H_{18}		1		1		
Question 10 total					1	3	1	5	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
11	(a)		<p>support (as carbon dioxide concentration has increased), the mean atmospheric temperature has increased (1)</p> <p>oppose (as carbon dioxide concentration has increased), the mean atmospheric temperature has fluctuated / increased and decreased (1)</p>			2	2	2	
	(b)		<p>both have decreased (1)</p> <p>award (1) for any of following</p> <ul style="list-style-type: none"> Greenland has seen a greater decrease (than Antarctica) Greenland has decreased by 3000Gt and Antarctica by 1500Gt <p>reference to incorrect values - neutral</p> <p>award (2) for Greenland has decreased by twice as much as Antarctica</p>			2	2	1	
	(c)		<p>award (1) for consequence and (1) for associated explanation e.g.</p> <p>increase in sea-levels (1) causing flooding / coastal erosion / contamination of drinking water (1)</p> <p>or</p> <p>habitat destruction (1) causing polar bears die (1)</p>	2			2		
Question 11 total				2	0	4	6	3	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
12	(a)	(i)	4.5 (2) accept values from 4.4-4.6 if answer incorrect award (1) for any indication of correct rearrangement of the equation e.g. $\frac{mass}{volume}$ or $\frac{45}{10}$		2		2	2	
		(ii)	award (2) for straight line from (0,0) to (10,79) award (1) for any one point marked correctly on grid tolerance $\pm\frac{1}{2}$ small square			2	2	2	
		(iii)	$9.6 - 5.0 = 4.6$ (1) density = $\frac{12.5}{4.6} = 2.7$ therefore metal must be aluminium (1) do not credit aluminium with no working		2		2	2	2
	(b)	(i)	(high) electrical conductivity / (good) electrical conductors (1) (high) ductility (1)			2	2		
		(ii)	higher electrical conductivity / better electrical conductor (than aluminium)			1	1		
		(iii)	lower density (than copper)			1	1		
Question 12 total				0	4	6	10	6	2

Common questions

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
13/1	(a)	(i)	hydrogen / H ₂ do not accept H accept hydrogen sulphide / H ₂ S		1		1		1
		(ii)	copper / Cu		1		1		1
		(iii)	award (2) for correctly balanced equation 2Fe + 3Cl ₂ → 2FeCl ₃ if incorrect award (1) for correct product FeCl ₃		2		2		
	(b)		Na ₂ SO ₄ (aq) + Fe(OH) ₂ (s) award (1) for each correct product award (1) for both state symbols correct award (2) max if balancing attempted	1	2		3		
			Question 13/1 total	1	6	0	7	0	2

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
14/2	(a)	(i)	award (1) for each correct answer						
			A	1					
			B	1					
			G	1					
			C		1				
			E		1		5		
		(ii)	5		1		1		
	(b)		10 neutrons						
			9 electrons						
			both needed	1			1		
			Question 14/2 total	4	3	0	7	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
15/3	(a)		2.10 / 2.1		1		1	1	1
	(b)		award (2) for 33.6 / 34 if incorrect award (1) for $\frac{2.1}{6.25}$ ECF possible from (a)	1	1		2	2	2
	(c)		water still present / not all the water has been removed (1) neutral answers - still wet / not stirred enough / only done once heat until constant mass (1) accept - heat for longer / use a higher temperature neutral answer - stir more / repeat			2	2		2
	(d)		add water / re-hydrate (1) it is a reversible reaction / reaction goes both ways (1)	2			2		2
			Question 15/3 total	3	2	2	7	3	7

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
16/4	(a)	(i)	award (1) for any of following <ul style="list-style-type: none"> • make it easier to see the colour change • easier to see colour change • colour change clearer • end point clearer 	1			1		1
		(ii)	26.2		1		1		1
		(iii)	24.6 (2) if incorrect award (1) for 24.55 (mean of two values) or 24.633		2		2	2	2
		(iv)	contain indicator	1			1		1
		(v)	award (1) for either of following <ul style="list-style-type: none"> • add 25.0 cm³ of alkali to 24.6 cm³ of acid • repeat using end-point volumes (of acid and alkali) with no indicator (1) ignore references to evaporation stage	2			2		2
	(b)		40 (1) 20 (1)			2	2	2	2
Question 16/4 total				4	3	2	9	4	9

Higher Tier only questions

Question		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)		award (1) for each correct formula CuSO ₄ MgCO ₃ HNO ₃		1	1 1	3		3
	(b)		on heating (1) ethanol boils at a lower temperature than water (1) ethanol boils first / ethanol boils off leaving water (1) if no other mark credited award (1) for ethanol and water have <u>different</u> boiling points	3			3		3
	(c)		award (1) for spot at 3.6 cm award (1) for second spot anywhere above spot at 3.6		1	1	2		2
Question 5 total				3	2	3	8	0	8

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			-10 to 30	1			1	1	
	(b)			<-10 and >50 °C			1	1	1	
	(c)			graph from 0°C to 60°C (1) highest point at 40°C (1)			2	2	2	
				Question 6 total	1	0	3	4	4	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	1920 (1) burning fossil fuels (1) neutral answers - fossil fuels / deforestation	1 1			2		
		(ii)	award (1) for any consequence and (1) for linked explanation e.g. (increased) global warming leading to sea-level rise sea-level rise leading to coastal erosion / flooding of coastal areas ice caps melting leading to sea-level rise climate change leading to habitat loss (increased) atmospheric temperature leading to disruption of weather patterns / more extreme weather accept any sensible alternatives and note that most points here could be classed as consequences or explanations	2			2		
	(b)	(i)	increases		1		1		
		(ii)	pH increases (1) neutral answer - acidity decreases lime is a base / neutralises the lake acidity (1) accept - lime is an alkali	2			2		
Question 7 total				6	1	0	7	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)		cryolite (1) accept - Na_3AlF_6 lowers the melting point of aluminium oxide (1) neutral answer - makes the process cheaper	2			2		
	(b)		at the cathode $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$ (1) at the anode $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$ (1) accept $2\text{O}^{2-} - 4\text{e}^- \rightarrow \text{O}_2$		2		2		
	(c)		close to coast to import bauxite / raw material / aluminium ore (1) neutral answer - reference to export of aluminium close to power station due to need of huge amounts of electricity (1)	2			2		
Question 8 total				4	2	0	6	0	0

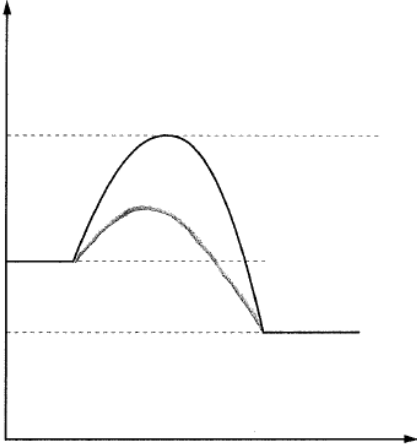
Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9	(a)		<p>no mark for opinion</p> <p>award (1) each for any two reasons supporting the same opinion</p> <p>award (1) max if reasons support different opinions</p> <p>no - it will not</p> <ul style="list-style-type: none"> • takes too long / slow process • only small amounts of metal obtained • only extract copper from top layer of soil / shallow mining • dependent on growing conditions / needs suitable rainfall <p>yes - it will</p> <ul style="list-style-type: none"> • less environmental damage / no open-cast mines / no SO₂ pollution • lower grade ores can be used/ high grade ores all used up • decontaminates soil of toxic metals 			2	2		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(b)	(i)		displacement (1) award (1) for any explanation <ul style="list-style-type: none"> adding a metal higher in reactivity series displaces a metal lower in series adding a metal above copper (in reactivity series) displaces copper from solution adding a more reactive metal (than copper) displaces it from solution add iron because it is above copper (in the reactivity series) so it will displace it from solution neutral answer - Cu ²⁺ gains electrons alternative method electrolysis (1) (aqueous) Cu ²⁺ ions attracted to cathode forming copper (1) neutral answer - Cu ²⁺ gains electrons	2			2		2
		(ii)	reduction is gain of electrons (1) Cu ²⁺ ions gain electrons to form Cu atoms (1) credit possible for equations e.g. Cu ²⁺ + 2e ⁻ → Cu (2) Fe + CuSO ₄ → FeSO ₄ + Cu (1)		2		2		
			Question 9 total	2	2	2	6	0	2

Question		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)		appropriate scales - use minimum half of grid (1) all points plotted correctly (1) tolerance $\pm \frac{1}{2}$ square straight line of best fit passing through (0,0) (1)		1 1 1		3	3	3
	(b)		40 (2) if incorrect award (1) for 0.025 read from graph		2		2	2	2
	(c)		number of (acid) particles (per unit volume) doubled (1) chance of collision doubled (1) award (1) for <u>more</u> particles linked to <u>greater</u> chance of collision	1	1		2	1	
	(d)		award (1) for reference to gas being formed by reaction award (1) for indication of measurement to be made and time e.g. <ul style="list-style-type: none"> measure volume of gas formed over time measure time taken for mass of container to fall by given amount 		2		2		2

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(e)	(i)	<p>increased surface area (1)</p> <p>award (1) for any of following</p> <ul style="list-style-type: none"> • greater chance of (successful) collisions • greater frequency of (successful) collisions • more (successful) collisions per second 	2			2		1
		(ii)	<p>award (1) for any of following</p> <ul style="list-style-type: none"> • particles move faster • particles have more energy • more particles have the activation energy <p>award (1) for any of following</p> <ul style="list-style-type: none"> • greater chance of (successful) collisions • greater frequency of (successful) collisions • more (successful) collisions per second 	2			2		1
			Question 10 total	5	8	0	13	6	9

Question		Marking details		Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
11	(a)		<p>C=C / double bond breaks (1)</p> <p>each carbon atom bonds with one bromine atom (1)</p> <p>accept $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{Br}-\text{C}-\text{C}-\text{Br} \\ & \\ \text{H} & \text{H} \end{array}$</p>	2			2		
	(b)	(i)	<p>award (1) for any of following</p> <p>$\begin{array}{c} \text{H} & & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & & \text{H} \end{array}$ $\begin{array}{c} \text{CH}_3 & & \text{CH}_3 \\ & \diagdown & / \\ & \text{C}=\text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$</p> <p>$\text{CH}_3\text{CH}=\text{CHCH}_3$</p>	1			1		
		(ii)	propan-2-ol	1			1		
	(c)		<p>$\begin{array}{c} \text{O} \\ \\ -\text{C} \\ \\ \text{OH} \end{array}$ neutral answer —COOH</p>	1			1		
Question 11 total				5	0	0	5	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
12	(a)	(i)	142 (2) if incorrect award (1) for $(4 \times 464) / 1856$		2		2	2	
		(ii)	214 / -214 (2) if incorrect award (1) for $1856 + 498 / 2354$ ECF possible from (i)		2		2	2	
	(b)	(i)	A	1			1		
		(ii)	 <p>pathway with lower activation energy</p>	1			1		
			Question 12 total	2	4	0	6	4	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
13	(a)		low temperature system will favour exothermic reaction / forward reaction (1) equilibrium moves to the right (1)	1		1			
			low pressure system will favour side with more gaseous particles (1) equilibrium moves to the left / backward reaction favoured (1)	1		1	4		
	(b)	(i)	300 °C and 220 atm both needed		1		1	1	
		(ii)	award (2) for curve which <ul style="list-style-type: none"> • goes from (0,0) • has similar shape to 300 and 500 °C curves • reaches yield between 50 and 75 % award (1) for curve which <ul style="list-style-type: none"> • goes from (0,0) • has similar shape to 300 and 500 °C curves • reaches yield between 24 and 49 % 			2	2		
	(c)	(i)	$4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$		1		1		
		(ii)	$2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$ (2) if incorrectly balanced award (1) for correct formulae of reactants and products		2		2		
Question 13 total				2	4	4	10	1	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
14	(a)	(i)	test 3 / flame test (1) calcium gives brick-red flame and sodium gives yellow/orange flame			2	2		2
		(ii)	test 1 / silver nitrate (1) (potassium) chloride gives a white precipitate (1) (potassium) iodide gives a yellow precipitate (1)			3	3		3
		(iii)	test 2 / add sodium hydroxide and warm (1) ammonium (chloride) gives pungent smell / gas which turns red litmus blue (1) magnesium (chloride) gives no reaction / white precipitate (1)			3	3		3
	(b)		$\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$		1		1		
Question 14 total				0	1	8	9	0	8

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
15			<p>Indicative content</p> <ul style="list-style-type: none"> sodium needs to lose one electron to achieve full outer shell chlorine needs to gain one electron to achieve full outer shell dot and cross diagram for sodium chloride ionic bonding <ul style="list-style-type: none"> shared pairs of electrons for both atoms to achieve full outer shells dot and cross diagram for methane covalent bonding <ul style="list-style-type: none"> dot and cross diagrams do not show <ul style="list-style-type: none"> 3D lattice of ionic sodium chloride - giant structure 3D shape of methane molecule - simple molecular relative strength of forces between ions, between atoms, between molecules relative sizes of particles <p>5-6 marks Dot and cross diagrams for both compounds showing good understanding of ionic and covalent bonding; reference to structure types; attempt at description of limitations in predicting structure type <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></p> <p>3-4 marks Basic dot and cross diagrams for both compounds clearly differentiating between ionic and covalent bonding <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></p> <p>1-2 marks Attempt at dot and cross diagram for sodium chloride and/or methane <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></p> <p>0 marks No attempt made or no response worthy of credit.</p>	4	2		6		
			Question 15 total	4	2	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
16	(a)			2.5×10^{-3} (2) if incorrect award (1) for 0.03 s		2		2	2	
	(b)			$3.125 / 3.13 / 3.1$ (2) if incorrect award (1) for correct conversion of units $75 \text{ dm}^3 = 75000 \text{ cm}^3$ or $24000 \text{ cm}^3 = 24 \text{ dm}^3$	1	1		2	2	
	(c)			$135.4 / 135.6 / 130$ (3) ECF possible from part (b) if incorrect award (1) each for either of following $\frac{2}{3} \times 3.125 / 2.083$ $M_r(\text{NaN}_3) = 65$		3		3	3	
	(d)			$10\text{Na} + 2\text{KNO}_3 \rightarrow \text{N}_2 + \text{K}_2\text{O} + 5\text{Na}_2\text{O}$ (2) if incorrect award (1) for correct formula KNO_3		2		2	1	
	(e)			$\begin{array}{c} \text{H} \quad \text{O} \\ \quad \\ -\text{N}-\text{C}- \end{array}$	1			1		
Question 16 total					2	8	0	10	8	0

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	6	1	0	7	0	6
2	4	1	0	5	0	4
3	6	2	0	8	2	0
4	0	5	4	9	0	4
5	0	7	2	9	5	7
6	3	5	1	9	4	6
7	2	1	2	5	1	0
8	9	0	0	9	0	0
9	3	5	0	8	2	8
10	1	3	1	5	0	0
11	2	0	4	6	3	0
12	0	4	6	10	6	2
13	1	6	0	7	0	2
14	4	3	0	7	0	0
15	3	2	2	7	3	7
16	4	3	2	9	4	9
TOTAL	48	48	24	120	30	55

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	6	0	7	0	2
2	4	3	0	7	0	0
3	3	2	2	7	3	7
4	4	3	2	9	4	9
5	3	2	3	8	0	8
6	1	0	3	4	4	0
7	6	1	0	7	0	0
8	4	2	0	6	0	0
9	2	2	2	6	0	2
10	5	8	0	13	6	9
11	5	0	0	5	0	0
12	2	4	0	6	4	0
13	2	4	4	10	1	0
14	0	1	8	9	0	8
15	4	2	0	6	0	0
16	2	8	0	10	8	0
TOTAL	48	48	24	120	30	45