# GCSE Chemistry (AQA 8462)

# Higher Tier

## Mark scheme

### Introduction

The information provided for each question is intended to be a guide to the type of answers students may produce, but can be neither exhaustive nor prescriptive. Award marks according to your professional judgement for all appropriate responses.

### Disclaimer

- These mark schemes and exemplar answer content are entirely the work of the question author and have not been produced by, reviewed by or endorsed by AQA.
- Where marks are suggested and levels mapped to particular styles or features of answers, these are intended for guidance only and cannot reflect the full examination marking process, which involves moderation and alignment of level boundaries across a full, national student cohort that cannot be determined from a standalone product such as this set of Practice Papers.
- Therefore, mark allocation, mark totals, suggested levels and overall assessments of performance as found in these Practice Papers and Mark Schemes represent only a limited guide to possible outcomes, and are not a reliable indicator of actual performance.

# Information for teachers

#### 1. General

The mark scheme for each question gives:

- the marks available for each part of the question
- the total marks available for the question
- the correct answer or, if multiple correct answers are possible, a typical correct answer with variations
- extra information to help with making decisions about how many marks to award
- the Assessment Objective(s) from the GCSE Specification that the part question is intended to cover.

The 'extra information' is aligned to the appropriate answer and is only intended for consideration with that particular part of the answer.

#### 2. Marking of lists

For question parts where a set number of responses is requested, all possible correct answers are stated. Each correct response should be awarded a mark as indicated, up to a maximum for the question part as stated on the question paper and as written in this marks scheme.

If a student has provided more than the set number of responses requested, the principle to be followed is that 'right + wrong = wrong'. Each error or contradictory response negates each correct response. If the number of errors and contradictions equals or exceeds the number of correct responses, no marks can be awarded for that part of the question.

#### 3. Use of symbols and formulae

If an accepted scientific symbol or formula is written instead of a required chemical name or unit, award full marks if the symbol or formula is correct and if, in the context of the question, the response is appropriate.

#### 4. Calculations

Award marks for each correctly completed stage of a calculation, as students are instructed to show their working.

Full marks can be given for a correct numerical answer (including units), even though no working is shown.

#### 5. Interpretation of 'it' and 'them'

Answers using the word 'it' or 'them' should be awarded marks only if it is clear that the 'it' or 'them' refers to the correct subject.

#### 6. Errors carried forward

An error in the answers to a structured question should be penalised once only.

Allowances for errors carried forward are usually restricted to calculation questions. Where such allowances are permissible, the mark scheme includes a statement such as 'allow ecf'.

#### 7. Phonetic spelling

The phonetic spelling of correct scientific terminology should be awarded marks unless there is a possible confusion with another technical term.

#### 8. Brackets

(.....) in this marks scheme indicates information that is not essential for a mark to be awarded, but is included to help you identify the sense of the required answer.

#### 9. Ignore / insufficient / do not allow

'Ignore' or 'insufficient' are used in this marks scheme to indicate information that is irrelevant to the question or not enough to gain the mark. Further correct amplification could gain the mark.

'Do not allow' indicates that this is a wrong answer which, even if the correct answer is also given, still means that the mark should not be awarded.

#### 'Level of response' marking instructions

'Level of response' mark schemes are broken down into levels, each of which is given a descriptor. The descriptor for a level shows the average performance for that level. There are marks allocated to each level.

Before applying the mark scheme to a student's answer, read through the answer and annotate it to show the qualities that are being looked for. Then apply the mark scheme.

#### Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a 'ladder' to see whether the answer meets the qualities given in the descriptor for that level. If the answer meets the lowest level, move up to the next level and repeat the assessment until you find a match between the descriptors and the answer.

When assigning a level, you should look at the overall quality of the answer and not be distracted by small details of the answer where the student may not have performed quite as well as their overall performance. If an answer covers different aspects of different levels of the mark scheme, use a 'best fit' approach: for example, if a response is predominantly level 2 with a small amount of level 3 material, place it in level 2 but award a mark near the top of the level because of the level 3 content.

#### Step 2 Determine a mark

The descriptors within each level can help with this, along with the exemplar answers or extra information given. Indicative content is provided as a guide. It is not exhaustive and you should credit other valid points in the answer. Students do not have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

Ignore any responses that are irrelevant. However, only award full marks if there are no incorrect or contradictory responses.

An answer that contains nothing of relevance to the question must be awarded no marks.

Read back through the full answer as you apply the mark scheme, so as to clarify points and assure yourself that the level and the mark are appropriate.

Paper 1					
	Q	uestion 1			
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
01.1	water	Accept hydrogen oxide Accept hydrogen hydroxide Accept dihydrogen oxide	1	AO/1 4.1.1.1	
01.2	methane	Accept carbon tetrahydride or hydrogen carbide	1	AO1/1 4.1.1.1	
TOTAL			2		
	Q	uestion 2			
02.1	63 (kJ per mole)	Ignore + or – If incorrect (611 + 432) = 1043 for 1 mark (347 + 413 + 346) = 1106 for 1 mark Correct subtraction of calculated energy values for 1 mark	3	AO2/4.5.1.3 MS 1a	
TOTAL		·	3		

Question 3							
QUESTION		ANSV	VERS		EXTRA INF	MARK	AO / SPEC. REF.
03.1	<b>0 marks</b> (1–2 marks)	<b>Level 1</b> (3–4 marks)	Level 2 (1–2 marks)	<b>Level 3</b> (5–6 marks)			AO3/ 4.2.2.1
	No relevant content.	There is an explanation for one state.	There is an explanation for two states.	There is an explanation for three states.			
	Examples of points that could be made include: In solids, the particles cannot move. In solids, the distance between the particles is very small.					1	
	In liquids, particle can move. The particles move in a random arrangement. In liquids, the distance between the particles is very small.				1		
	In gases, the particles can move. In gases, the particles spread out as far as possible so that take up as much space as possible.				1		
03.2	the particles are assumed to be solid inelastic spheres the particles are assumed to have no forces between				1	AO1/ 4.2.2.1	
TOTAL	them				8		
			Questio	on 4		<u>.</u>	
04.1	A or B					1	AO1/ 4.1.2.3
04.2	C, D or E					1	AO1/ 4.1.2.3
04.3	D					1	AO1/ 4.1.2.6
04.4	E it has a full outer shell of electrons				1 1	AO1/ 4.1.2.4 AO2/ 4.1.2.4	
TOTAL						5	

Question 5					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
05.1	equation to use is number of moles = concentration × volume $0.6 \times \frac{50}{1000} = 0.03$ moles of HCl 2 moles of HCl react with 1 mole of Ca(OH) <sub>2</sub> $\frac{0.03}{2} = 0.015$ moles of Ca(OH) <sub>2</sub> react $0.015 = \text{concentration} \times \frac{30}{1000}$ concentration = $0.015 \times \frac{1000}{30}$ concentration of Ca(OH) <sub>2</sub> = $0.5 \text{ mol/dm}^3$		1 1 1 1 1	AO2/4.3.4 MS1c	
TOTAL		<u> </u>	6		
Question 6					
06.1	17		1	AO2/4.1.1.6	
06.2	100(%)		1	AO2/4.3.3.2 MS1a/1c	
06.3	$M_{\rm r} \text{ of } N_2 = 28$ moles of $N_2 = \frac{14}{28} = 0.5$ 1 mole of nitrogen makes 2 moles of ammonia mass of NH <sub>3</sub> = 0.5 × 2 × 17 = 17 g	correct answer scores 4 marks 34 g scores 3 marks (student thinks that $N_2$ has an $M_r$ of 14) 8.5 g scores 3 marks (student assumes a 1:1 relationship) allow ecf	1 1 1 1	AO2/4.3.2.2 MS1a/1b/ 3b/3c	
06.4	<sup>2.55</sup> / <sub>17</sub> × 100 = 15%	allow ecf from 06.3 if maximum mass of ammonia of 51 g was used, the answer is 5% if 34 g was used, the answer is 7.5% if 8.5 was used, the answer is 30%	1	AO2/4.3.3.1 MS1c	
06.5	the reaction is reversible so it will not go to completion	ignore any other reasons as they cannot be deduced from the equation	1	AO1/4.3.3.1	
TOTAL			9		

Question 7					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
07.1	24 electrons have no mass <i>or</i> electrons have a mass of 1/1800 to 1/2000 <i>or</i> electrons have negligible mass		1	AO1/4.1.1.5 AO2/4.1.1.5	
07.2	12		1	AO1/4.2.1.2	
07.3	10		1	AO1/4.2.1.2	
07.4	2+	accept +2 accept ++	1	AO1/4.2.1.2	
07.5	2+	accept +2 accept ++	1	AO2/4.2.1.2	
TOTAL			6		
	Q	uestion 8			
08.1	Υ		1	AO2/4.1.3.1	
08.2	Х		1	AO2/4.1.2.5	
08.3	rubidium		1	AO2/4.1.2.5	
TOTAL			3		
	Q	uestion 9			
09.1	gold is not reactive enough		1	AO1/4.4.1.2	
09.2	the copper would turn silver		1	AO1/4.4.1.2 WS 2.6	
09.3	the atoms/ions are arranged in layers they/the layers slide over each other		1	AO2/4.2.1.5	
TOTAL			4		

Question 10						
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.		
10.1	A = iodine or astatine B = fluorine C = bromine D = chlorine		1 1 1 1	AO1/4.1.2.6		
TOTAL			4			
	Questio	n 11		·		
11.1	С		1	AO1/4.4.2.2		
11.2	A		1	AO1/4.4.2.1		
11.3	D		1	AO1/4.4.2.2		
11.4	В		1	AO1/4.4.2.2		
TOTAL			4			
	Questio	n 12				
12.1	there is an equilibrium sign	ignore any answer that does not refer to the equation, e.g. 'it is a weak acid'	1	AO1/4.4.2.6		
12.2	HNO <sub>3</sub>	Accept 2HNO <sub>3</sub>	1	AO1/4.1.1.1		
12.3	before: red after: orange, yellow, green		1	AO1/4.4.2.4 WS 2.6		
12.4	bubbles <i>or</i> the calcium carbonate would disappear		1	AO1/4.4.2.2 WS 2.6		
12.5	the reaction would be slower <i>or</i> bubbles would appear more slowly <i>or</i> the calcium carbonate would disappear more slowly		1	AO2/4.4.2.6 WS 2.6		
TOTAL			6			

Question 13					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
13.1	so that the ions can move	also accept so the ions are free	1	AO2/4.4.3.1	
13.2	2Cl⁻ 2e⁻		1	AO2/4.4.3.1	
13.3	it has lost electrons	accept loss of electrons	1	AO1/4.4.1.4	
13.4	bubbles or effervescence	ignore chlorine	1	AO2/4.4.3.2/ WS 2.6	
13.5	hydrogen will form at the negative electrode		1	AO2/4.4.3.4	
	lead chloride solution contains H+ ions		1		
	lead is more reactive than hydrogen or hydrogen is less reactive than lead		1		
TOTAL			8		
	Question 1	4			
14.1	$H_2 (g) + 2OH^- (aq) \rightarrow 2H_2O (l) + 2e^-$		1	AO2/4.5.2.2	
14.2	$O_2$ (aq) + 2H <sub>2</sub> O (aq) + 4e <sup>-</sup> $\rightarrow$ 4OH <sup>-</sup> (aq)		1	AO2/4.5.2.2	
14.3	<ul> <li>Advantage: Any one from:</li> <li>They do not need to be electrically recharged.</li> <li>No pollutants are produced.</li> <li>Can be a range of sizes for different uses.</li> <li>Disadvantages: Any one from:</li> <li>Hydrogen is highly flammable.</li> <li>Hydrogen is sometimes produced for the cell by a non-renewable resource.</li> <li>Hydrogen is difficult to store.</li> </ul>				
TOTAL			4		
	Question 1	5			
15.1	0 or 0.00		1	AO2/4.5.2.1	
15.2	magnesium and copper they have the largest difference in reactivity		1 1	AO3/4.5.2.1	
TOTAL			3		

Question 16					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
16.1	any <b>two</b> from: • use a polystyrene cup • use a lid • stir the mixture	accept add insulation	2	AO3/4.5.1.1	
16.2	endothermic the temperature decreases		1 1	AO1/4.5.1.1 AO1/4.5.1.1	
16.3	the reaction ended		1	AO2/4.5.1.1	
16.4	take more readings between 6 and 7 minutes	take more readings is insufficient (need to say when) ignore 'repeat'	1	AO3/4.5.1.1	
TOTAL			6		
	Qı	uestion 17			
17.1	<ul> <li>"Ball and stick" model Advantage:</li> <li>3 dimensional</li> <li>shows that there is a lattice Disadvantage:</li> <li>lines imply that the bond is covalent</li> <li>the ions are too far apart "Dot and cross" model Advantage:</li> <li>shows the charge on the ions</li> <li>shows the electron configuration of the ions Disadvantage:</li> <li>is not 3D</li> <li>does not show the lattice "2 dimensional" model Advantage:</li> <li>shows the charges on the ions</li> <li>shows the charges on the ions</li> <li>shows the the ions are in a lattice</li> <li>Disadvantage:</li> <li>is not 3 dimensional</li> </ul>		1 1 1 1 1	AO2/4.4.3.1	
TOTAL			6		

Question 18						
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.		
18.1	<ul> <li>Any four from:</li> <li>metals have high melting points</li> <li>because there are many (electrostatic attractions)</li> <li>there are electrostatic attractions)</li> <li>there are electrostatic attractions between positive metal ions and negative electrons</li> <li>the electrostatic attractions require a lot of energy to break</li> <li>metals conduct heat well</li> <li>because they have free electrons</li> </ul>		4	AO2/4.2.2.7		
18.2	wood does not conduct heat	accept covalent substances do not conduct heat	1	AO1/4.2.2.6		
18.3	A		1	AO1/4.2.2.5		
18.4	there are weak forces between the molecules they require little energy to break bromine has a low boiling point	do not accept weak bonds	1 1 1	AO2/4.2.2.5		
TOTAL			9			

Question 19					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
19.1	it is a rough titre	accept estimate	1	AO2/4.4.2.5	
19.2	25.55	If the answer is not correct then working showing $\frac{25.50 + 25.60}{2}$ obtains 1 mark 25.6 (cm <sup>3</sup> ) obtains 2 marks because it is not to the appropriate number of sf. 25.83 (cm <sup>3</sup> ) obtains 2 marks because the anomaly has not been discounted 25.8 (cm <sup>3</sup> ) obtains 1 mark because the anomaly has not been discounted and it is not to the appropriate number of sf	3	AO2/4.4.2.5 MS 2a MS 2b	
TOTAL			4		

Paper 2							
Question 1							
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.			
01.1	Draw a <b>pencil</b> line on the chromatography paper. Using the capillary tube take a small sample of the ink and put it on the pencil line.	must specify pencil	1	AO2/4.8.1.3 WS 2.2, 3.1, 2.3 AT 1, AT 4			
	water level below the pencil line and the ink sample. The stationary phase is the paper and the mobile phase is the water.		1				
01.2	chromatogram B		1	AO2/4.8.1.3			
01.3	4 ÷ 10 = 0.4	no units	1	AO2/4.8.1.3			
01.4	0.7 × 8 = 5.6 cm	unit needed	1	AO2/4.8.1.3			
01.5	any <b>two</b> from: rapid sensitive accurate	Accept converse	2	AO1/4.8.3.6			
TOTAL			9				
	Quest	ion 2					
02.1	Compound 1 is sodium chloride. Yellow flame, so there are sodium ions present.		1 1	AO3 4.8.3.1, 3, 4 WS 2.2			
	It makes a white precipitate when added to acidified silver nitrate, so there are chloride ions present.		1				
	Orange flame, so there are calcium ions present. When it reacts with acid, a gas is		1				
	produced which makes limewater cloudy, so carbon dioxide is present.						
02.2	barium	accept Ba	1	AO1/4.8.3.7			
TOTAL			7				

Question 3					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
03.1	manganese(IV) oxide is the catalyst when added, the hydrogen peroxide decomposes more quickly		1	AO3/4.6.1.4	
03.2	it provides a different pathway for the reaction by lowering the activation energy		1	AO2/4.6.1.4	
TOTAL			4		
Question 4					
04.1	oxygen water	accept $O/O_2$ accept $H_2O$	1 1	AO1/4.6.1.4 WS 2.2, 7, 3.5	
04.2	the iron would not be rusty the magnesium would have a white solid on it		1 1	AO2/4.6.1.4 WS 2.2, 7, 3.5	
04.3	magnesium is more reactive (than iron) magnesium reacts with the oxygen and water instead of the iron	must be a comparative accept converse	1	AO2/4.6.1.4	
TOTAL			6		
	Q	uestion 5			
05.1	the molecular chains in polymer <b>B</b> are further apart less energy is needed to separate the chains		1	AO1/ 4.10.3.3	
05.2	A (has higher melting point) the molecular chains in polymer <b>A</b> are closer together more energy is needed to separate the chains		1 1 1	AO1/ 4.10.3.3	
TOTAL			5		

Question 6					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
06.1	$C_2H_5OH + 3O_2 \rightarrow 3H_2O + 2CO_2$	1 mark for correct reactants (order not important) accept $C_2H_6O$ for ethanol 1 mark for correct products (order not important) 1 mark for the correct stoichiometry	3	AO3/4.7.2.3	
06.2	ethanoic acid	accept acetic acid	1	AO1/4.7.2.3	
06.3	H O H-C-C H H H O-C-C-H H O-C-C-H H H		1	AO1/4.7.2.4	
06.4	bubbles/fizzing the piece of sodium gets smaller		1 1	AO1/4.7.2.3	
06.5	add a lit splint it will go pop	accept it will explode	1 1	AO1/4.8.2.1	
06.6	Advantages: • renewable raw materials • carbon neutral Disadvantages: • batch reaction • the ethanol is not pure • it requires land to grow the plants	accept all converses when compared to reacting ethene with steam	1	AO1/4.7.2.3	
TOTAL			11		

Question 7					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
07.1	natural gas	accept methane	1	AO1/ 4.10.4.1	
07.2	the air	accept the atmosphere	1	AO1/ 4.10.4.1	
07.3	it would increase the amount of ammonia	accept it would decrease the amount of nitrogen and hydrogen/ reactants	1	AO2/ 4.10.4.1 WS 3.5/3.8	
07.4	it would increase the amount of ammonia	accept it would decrease the amount of nitrogen and hydrogen/ reactants	1	AO2/ 4.10.4.1 WS 3.5/3.8	
07.5	it would decrease the amount of ammonia	accept it would increase the amount of nitrogen and hydrogen/reactants	1	AO2/ 4.10.4.1 WS 3.5/3.8	
07.6	no effect		1	AO2/ 4.10.4.1 WS 3.5/3.8	
07.7	450 °C 200 atm	accept 400–500 °C accept 180–220 atm	1 1	AO1/ 4.10.4.1	
07.8	the temperature needs to be high enough for the reaction to happen at a fast rate the pressure cannot be too high because it could cause an explosion	accept at a low temperature, the rate is too slow	1 1	AO3/ 4.10.4.1 WS 3.5/3.8	
TOTAL			10		

Question 8						
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.		
08.1	$M_{r}(\text{heptane}) = 7 \times 12 + 16 \times 1 = 100$ 20 000/100 = 200 mol 1 mole of heptane produces 7 moles of CO <sub>2</sub> 200 × 7 = 1400 mol $M_{r}(\text{carbon dioxide}) = 12 + 2 \times 16 = 44$ 1400 × 44 = 61 600 g = 61.6 kg	accept final mass in grams	1 1 1 1	AO2/4.3.2.2 4.7.1.3 MS1c		
08.2	carbon monoxide it is toxic particulates they cause global dimming / they damage the cells in our lungs / they cause lung cancer	accept binds to haemoglobin in red blood cells accept soot / carbon / unburnt hydrocarbons	1 1 1	AO1/4.9.3.1		
TOTAL			8			

Question 9						
QUESTION	ANSWERS		EXTRA INFORMATION	MARK	AO / SPEC. REF.	
09.1	<b>Level 3:</b> A detailed and coherent argument is provided which considers a range of issues and comes to a conclusion consistent with the reasoning.	5–6			AO3 4.7.1.2 4.7.1.4 4.10.2.1	
	<b>Level 2:</b> An attempt to describe the advantages and disadvantages of the production and uses is made, which comes to a conclusion. The logic may be inconsistent at times but builds towards a coherent argument.	3–4				
	<b>Level 1:</b> Simple statements made. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.	1–2				
	No relevant content.	0				
	Advantages of paper bags: • made from renewable materials • they break down in landfill • can be recycled			1		
	<ul><li>Disadvantages of paper bags:</li><li>requires lots of water to make</li><li>bleach and acid will pollute water</li></ul>			1		
	<ul> <li>Advantages of plastic bags:</li> <li>they don't break down so they can be reused more</li> </ul>			1		
	<ul> <li>Disadvantages of plastic bags:</li> <li>made from non-renewable materials</li> <li>the energy required for the high temperature and pressure releases lots of CO<sub>2</sub></li> <li>they do not break down in landfill</li> <li>Conclusion (with reason)</li> </ul>			2		
TOTAL				6		

Question 10						
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.		
10.1	<ul> <li>Any two from:</li> <li>put the boiling tube in icy water, so that the water condenses more easily</li> <li>put a thermometer in the conical flask, so you can tell what temperature the water boils at</li> <li>put anti-bumping granules in the salt water, to stop bumping</li> </ul>	accept broken pottery accept to stop the liquid spilling	4	AO3/ 4.10.1.2 4.1.1.2 AT 2, 3, 4 WS 2.3		
10.2	Determine the boiling point the boiling point should be 100 °C. Also determine the pH. The pH should be exactly 7. Can accept one or the other.		1	AO1/4.2.2.1 4.8.1.1 4.10.1.2		
TOTAL						
	Ques	tion 11				
11.1	$ \begin{array}{c}                                     $	or COOH group at other end of molecule	1	AO1/4.7.2.4		
11.2	О Н О Н Н               H-O-C-C-C-O-C-C-O-H           H H H	3 marks for complete structure 1 mark for O 1 mark for O H H-O-C-C- H 1 mark for H H -C-C-O-H H H	3	AO2/4.7.3.2		
11.3	water	accept H <sub>2</sub> O	1	AO1/4.7.3.2		
TOTAL			5			

Question 12					
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.	
12.1	1513	1512.5 gets 2 marks (not to correct number of sf) 1350 gets 2 marks (this indicates the student included the anomaly in the mean) if no final answer $\frac{1445 + 1580}{2}$ gets 1 mark	3	AO2/ 4.10.3.3 MS 2a MS 2b	
12.2	support dense transparent		3	AO1/ 4.10.3.3	
TOTAL			6		
	Qı	uestion 13			
13.1	tangent correctly drawn rate of reaction = $\frac{\text{mass}}{\text{time}}$ correct answer	accept 0.5 g/s to 0.83 g/s accept 30 g/min to 50 g/min the correct answer with no working gains 3 marks	1 1 1	AO2/4.6.1.1 MS 4e	
13.2	$6 \times 1.2 \times 1.2 = 8.64 \text{ cm}^2$		1	MS 5c	
13.3	$8 \times 6 \times 0.6 \times 0.6 = 17.28 \text{ cm}^2$	accept 2.16 cm <sup>3</sup> for 1 mark	2	MS 5c	
13.4	steeper curve going down flat line at 100g		1	AO3/4.6.1.3	
TOTAL			8		

Question 14						
QUESTION	ANSWERS	EXTRA INFORMATION	MARK	AO / SPEC. REF.		
14.1	1 × 10 <sup>-2</sup> cm <sup>3</sup>	accept 0.01 cm <sup>3</sup>	1	AO2/ 4.10.4.2		
14.2 14.3 TOTAL	$\frac{26.45 + 26.40}{2}$ = 26.43 given to 4 significant figures Ammonium sulfate	26.43 with no working gets 3 marks 26.425 gets 2 marks (indicates the student used too many significant figures) 26.8 gets 2 marks (indicates the student used the anomaly in the mean) 26.75 gets 1 mark (indicates the student used the anomaly in the mean and to too many significant figures)	1 1 1 1 5	AO2/ 4.10.4.2 AO1/ 4.10.4.2		
	Qı	uestion 15				
15.1	$\frac{750\ 000}{50\ 000} \times 100 = 1500\%$	1500 with no working or units gets 1 mark	1	AO2/4.9.1.2		
15.2	<ul> <li>any two from</li> <li>photosynthesis from plants/ algae</li> <li>oceans absorbed the CO<sub>2</sub></li> <li>CO<sub>2</sub> was locked up in the shells of marine organisms</li> <li>carbon was locked up in coal</li> </ul>		2	AO1/4.9.1.4		
15.3	$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$	accept multiples	1	AO2/4.9.1.2		
TOTAL			4			



### SCHOLASTIC

Scholastic Education, an imprint of Scholastic Ltd Book End, Range Road, Witney, Oxfordshire, OX29 0YD

Registered office: Westfield Road, Southam, Warwickshire CV47 0RA

www.scholastic.co.uk

© 2018, Scholastic Ltd 1 2 3 4 5 6 7 8 9 8 9 0 1 2 3 4 5 6 7

British Library Cataloguing-in-Publication Data A catalogue record for this book is available from the British Library.

ISBN 978-1407-17634-5

Printed by Bell & Bain Ltd, Glasgow

All rights reserved. This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, hired out or otherwise circulated without the publisher's prior consent in any form of binding or cover other than that in which it is published and without a similar condition, including this condition, being imposed upon the subsequent purchaser.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, other than for the purposes described in the content of this product, without the prior permission of the publisher. This product remains in copyright. Every effort has been made to trace copyright holders for the works reproduced in this book, and the publishers apologise for any inadvertent omissions.

Author Stuart Lloyd

Editorial Team Aidan Gill, Turnstone Solutions Limited, Tim Jackson

Cover and Series Design Andrea Lewis

Design Oxford Designers & Illustrators Ltd