



GCSE CHEMISTRY 8462/1H

Paper 1 Higher Tier

Mark scheme

June 2025

Version: 1.0 Final



Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the examiner make their judgement
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent (for example, a scientifically correct answer that could not reasonably be expected from a student's knowledge of the specification).

2. Emboldening and underlining

- 2.1** In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**.
Alternative words in the mark scheme are shown by a solidus eg allow smooth / free movement.
- 2.4** Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of errors / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name **two** magnetic materials.

[2 marks]

Student	Response	Marks awarded
1	iron, steel, tin	1
2	cobalt, nickel, nail*	2

3.2 Use of symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, or uses symbols to denote quantities in a physics equation, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. At any point in a calculation students may omit steps from their working. If a subsequent step is given correctly, the relevant marks may be awarded.

Full marks should be awarded for a correct numerical answer, without any working shown. Full marks are **not** awarded for a correct final answer from incorrect working.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

An error can be carried forward from one question part to the next and is shown by the abbreviation 'ecf'.

Within an individual question part, an incorrect value in one step of a calculation does not prevent all of the subsequent marks being awarded.

3.6 Phonetic spelling

Marks should be awarded if spelling is not correct but the intention is clear, **unless** there is a possible confusion with another technical term.

3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do not accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

3.11 Numbered answer lines

Numbered lines on the question paper are intended to support the student to give the correct number of responses. The answer should still be marked as a whole.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and, if necessary, annotate it (as instructed) to show the qualities that are being looked for. You can 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 descriptor for that level.

The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

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

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	towards the right and the top	allow a description of the position in the periodic table allow in Groups (3) 4 to 0	1	AO1 4.1.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	a melting point below 100 °C		1	AO3 4.1.2.3 4.2.2.7 4.2.2.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3		allow any combination of x, ●, o, e ⁽⁻⁾ for electrons	1	AO1 4.1.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	any one from: • so elements / tellurium / iodine were in groups with similar properties • iodine has similar properties to Group 7 elements • iodine has different properties to Group 6 elements	ignore reference to atomic structure allow named element(s) for Group 6 / 7 elements allow converse arguments in terms of tellurium	1	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	argon has a full outer shell (of electrons) (so argon) has a stable arrangement of electrons or (so argon) has a stable electronic structure	allow energy level for shell allow argon has eight outer shell electrons ignore argon has no outer shell electrons allow (so argon) does not gain / lose / share electrons	1 1	AO1 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	atoms with the same number of protons	allow atoms of the same element allow atoms with the same atomic number ignore atoms with the same number of electrons	1	AO1 4.1.1.5
	(but with) different numbers of neutrons		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	~115		1	AO2 4.1.1.6

Total Question 1	9
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Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	CaS		1	AO2 4.2.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	calcium (atom) loses electrons		1	AO2 4.2.1.1 4.2.1.2
	sulfur (atom) gains electrons		1	
	reference to transfer of two electrons		1	
	calcium forms positive ions and sulfur forms negative ions	allow Ca^{2+} (ions) and S^{2-} (ions) are formed allow calcium ions and sulfide ions are formed	1	

Question	Answers	Mark	AO / Spec. Ref.
02.3	Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO1 4.2.1.1 4.2.1.4 4.2.2.6 4.2.3.2
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content - giant structure - layers - of hexagonal rings - each (carbon) atom forms three bonds - has no covalent bonds between layers - with delocalised electrons - one delocalised electron from each carbon atom - the bonds are covalent - with shared (pairs of) electrons - the (covalent) bonds are strong		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	the molecules do not have an (overall electric) charge	allow there are no ions allow there are no delocalised electrons	1	AO1 4.2.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	poly(ethene) has stronger intermolecular forces to overcome than methane		1	AO1 4.2.2.4 4.2.2.5

Total Question 2	11
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Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(substance reduced) SnO_2	allow tin oxide	1	AO2 4.4.1.1 4.4.1.3
	(reason) (SnO_2) loses oxygen	allow (tin oxide) loses oxygen MP2 is dependent upon MP1 being awarded	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	carbon is more reactive than tin	allow tin is less reactive than carbon	1	AO3 4.4.1.2 4.4.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	(total $M_r = 128 + 12 =$) 140	allow (total $M_r = 112 + 12 + 16 =$) 140	1	AO2 4.3.3.2
	(% atom economy =) $\frac{112}{140} \times 100$	allow correct use of an incorrectly determined total M_r	1	
	= 80 (%)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	any two from: tungsten • has a higher melting / boiling point • is denser • is harder • is stronger • is less reactive • has ions with different charges • forms coloured compounds • can be a catalyst	allow the converse for potassium allow the transition metal for tungsten allow the Group 1 metal for potassium ignore references to atomic structure allow is less malleable / ductile allow specific reactions showing difference in reactivity	2	AO1 4.1.2.5 4.1.3.1 4.1.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	(sum of relative formula masses on left hand side =) $232 + (3 \times 2) = 238$	allow (sum of relative formula masses on left hand side =) $232 + 6 = 238$	1	AO2 4.3.1.1 4.3.1.2
	(is equal to sum of relative formula masses on right hand side =) $184 + (3 \times 18) = 238$	allow (is equal to sum of relative formula masses on right hand side =) $184 + 54 = 238$ if no other mark awarded, allow 1 mark for $232 + (3 \times 2) = 184 + (3 \times 18)$ or $232 + 6 = 184 + 54$ or allow 1 mark for both sides = 238	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	for sustainable development or for economic reasons	allow to minimise use of limited resources allow to minimise use of energy allow to minimise waste ignore references to yield	1	AO1 4.3.3.2

Total Question 3	11
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Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	–34 °C	allow a value in the range –70 to –20 °C	1	AO3 4.1.2.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	solid	allow (s)	1	AO3 4.1.2.6 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	7		1	AO1 4.1.2.1 4.1.2.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	HAt		1	AO2 4.1.2.1 4.1.2.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	reactivity decreases (going down the group)	allow energy level for shell	1	AO1 4.1.2.6
	(because) the outer shell / electrons become further from the nucleus	allow (because) the atoms become larger allow (because) the atoms have more shells	1	
	(so) there is less (electrostatic) attraction between the nucleus and the outer electron(s)	allow (so) there is more shielding between the outer electron(s) and the nucleus	1	
	(so) gaining an electron is more difficult		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	$\text{Br}_2 + 2\text{KI} \rightarrow \text{I}_2 + 2\text{KBr}$	allow multiples allow 1 mark for Br_2 and I_2 allow 1 mark for KI and KBr ignore state symbols	3	AO2 4.1.1.1 4.1.2.6

Total Question 4	11
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Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	a ball of positive charge	allow a positive(ly charged) ball do not accept references to protons, nuclei, neutrons	1	AO1 4.1.1.3
	with (negative) electrons embedded		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	any two from: - the mass of the atom is concentrated at the centre / nucleus - the nucleus is positive / charged - most of the atom is empty space - electrons orbit the nucleus	do not accept references to shells	2	AO1 4.1.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	electrons orbit the nucleus at specific distances	allow electrons orbit the nucleus in energy levels allow electrons orbit the nucleus in shells	1	AO1 4.1.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	~100 000 times larger		1	AO2 4.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	(surface area = $6 \times 1.2^2 =$) 8.64 (nm ²)		1	AO2 4.2.4.1
	(volume = $1.2^3 =$) 1.728 (nm ³)		1	
	(ratio = 8.64 : 1.728 =) $\frac{8.64}{1.728}$ (: 1)	allow (ratio = 1.728 : 8.64 =) (1 :) $\frac{1.728}{8.64}$	1	
	= 5 : 1	allow correct use of incorrectly determined values of surface area and / or volume allow = 1 : 0.2	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6		allow converse arguments in terms of fine particles		AO3 4.2.4.2
	(nanoparticles) have a higher surface area to volume ratio		1	
	(so) less coating is used	(so) a thinner layer can be used	1	
	OR (with nanoparticles) a thinner layer can be used (1) (so) more light gets through the lenses (1)	allow less coating is used allow (so) visibility is not reduced (as much)		

Total Question 5	12
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Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	strong electrostatic forces	allow strong forces of attraction ignore strong ionic bonds	1	AO1 4.2.1.3 4.2.2.3
	between oppositely charged ions	allow between (positive) aluminium ions and (negative) oxide ions allow between Al^{3+} (ions) and O^{2-} (ions)	1	
	(which) act in all directions (in the giant structure)		1	
	(so) need a lot of energy to break (the many strong bonds)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	cryolite	allow Na_3AlF_6	1	AO1 4.4.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	the mixture has a lower melting point than aluminium oxide	allow to lower the melting point (of the mixture) allow to lower the energy demand (of the process)	1	AO1 4.4.3.3

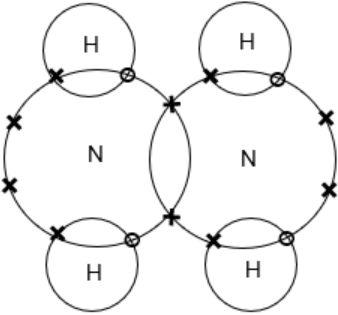
Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$	allow multiples allow 1 mark for $\text{O}^{2-} \rightarrow \text{O}_2 + \text{e}^-$ with no / incorrect balancing numbers	2	AO2 4.1.1.1 4.4.3.2 4.4.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	the (positive) electrode is made of carbon / graphite		1	AO1 4.4.3.3
	(so) the carbon / graphite reacts with oxygen (produced in the electrolysis)		1	
	(which) produces carbon dioxide		1	

Total Question 6	11
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Question 7

Question	Answers	Mark	AO / Spec. Ref.
07.1	Level 2: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 4.5.2.2
	Level 1: Some logically linked reasons are given. There may also be a simple judgement.	1–2	
	No relevant content	0	
	Indicative content - hydrazine is liquid so easier to store / transport - because takes up less space - both have significant dangers - both produce harmless products - hydrazine produces a higher voltage so fewer cells will be needed (to produce the same voltage) - so the battery would be lighter - hydrazine needs no catalyst so costs may be less - hydrogen uses platinum as a catalyst which is a rare metal - judgement		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	bonded pair of electrons in each overlap	allow any combination of x, o, e ⁽⁻⁾ , ● for electrons	1	AO2 4.2.1.4
	each nitrogen atom with 2 non-bonded electrons	do not accept if extra electrons on hydrogen atom(s) MP2 is dependent upon the award of MP1 an answer of  scores 2 marks	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	(the ball and stick model) shows the shape (of the molecule) or (the ball and stick model) is 3-D		1	AO1 4.2.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	(bonds broken = $(4 \times 391) + 498 + \mathbf{X} =$ $2062 + \mathbf{X}$	allow correct use of incorrectly determined values of bonds broken and / or bonds made	1	AO2 4.5.1.3
	(bonds formed = $945 + (4 \times 464) =$ 2801		1	
	$581 = 2801 - (2062 + \mathbf{X})$		1	
	$(\mathbf{X} =) 158 \text{ (kJ/mol)}$		1	
Total Question 7			11	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	OH ⁻		1	AO1 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	any two from: (improvement) use phenolphthalein (instead of universal indicator) (reason) so that the colour change is sharp or (improvement) use a pH probe (reason) so the pH probe shows a sharper endpoint (than universal indicator) OR (improvement) add the sodium hydroxide solution drop by drop (near the end point) (reason) the volume (of sodium hydroxide solution) used is more accurate OR (improvement) read burette at eye level (reason) the volume (of sodium hydroxide solution) used is more accurate OR (improvement) rinse burette with sodium hydroxide and pipette with acid (reason) remove contaminants	1 mark for improvement, 1 mark for reason reason must be linked to the corresponding improvement allow methyl orange for phenolphthalein allow any named single change indicator for phenolphthalein allow universal indicator changes colour too gradually allow universal indicator has too many colour changes ignore specific colour changes allow add the alkali drop by drop (near the end point) allow so the end point is more accurate allow read (volume) at the bottom of the meniscus allow to reduce parallax error	4	AO3 4.4.2.5 RPA 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	24.70 (cm ³)	allow 24.7 (cm ³)	1	AO2 4.4.2.5 RPA 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	$\left(\text{moles acid} = \frac{25.0 \times 0.216}{1000} = \right)$ 0.00540		1	AO2 4.3.2.5 4.4.2.5 RPA 2
	(moles alkali = 0.00540 × 2 =) 0.0108	allow correct use of incorrectly determined number of moles of acid	1	
	(concentration =) $0.0108 \times \frac{1000}{11.25}$	allow correct use of incorrectly determined number of moles of alkali	1	
	= 0.960 (mol/dm ³)	allow = 0.96 (mol/dm ³)	1	
	alternative approach: $\left(\frac{\text{moles acid}}{\text{moles alkali}} = \right)$ $\frac{2}{1} = \frac{11.25 \times \text{conc}}{25.0 \times 0.216} \quad (2)$	allow inverted expression		
	(concentration =) $\frac{2 \times 25.0 \times 0.216}{11.25} \quad (1)$ = 0.960 (mol/dm ³) (1)	allow 1 mark for the expression with an incorrect mole ratio allow correct use of the expression with incorrect mole ratio allow = 0.96 (mol/dm ³)		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	the HCl is a more dilute and stronger acid than the HCN		1	AO2 4.4.2.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	(HCl has a) higher concentration of hydrogen ions	allow HCN has a lower concentration of hydrogen ions	1	AO2 4.3.2.5 4.4.2.6
	(because) concentration of hydrogen ions in HCl is 0.1 (mol/dm ³) and concentration of hydrogen ions in HCN is 0.0002 (mol/dm ³)		1	

Total Question 8	13
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Question 9

Question	Answers	Mark	AO / Spec. Ref.
09.1	Level 3: The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5–6	AO3 4.1.1.2 4.4.2.3 RPA1
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content dissolve iodine in ethanol • in a beaker add zinc to iodine solution • stir continue adding until zinc is in excess • shown by solid remaining filter (the reaction mixture) • to remove the excess zinc heat the solution • using a water bath or • using an electric heater • to evaporate off some of the ethanol • cool / leave remaining solution to crystallise		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	$\left(\text{moles I}_2 = \frac{6.35}{254} =\right) 0.025$		1	AO2 4.3.1.1 4.3.2.1 4.3.2.2 4.3.3.1
	(moles $\text{ZnI}_2 = 0.025$ theoretical mass $\text{ZnI}_2 =$ $0.025 \times 319 =$ 7.975 (g)	allow (moles $\text{Zn} = 0.025$ mass of $\text{Zn} = 0.025 \times 65 =$ 1.625 g theoretical mass $\text{ZnI}_2 =$ $1.625 + 6.35 =$) 7.975 (g)	1	
		allow correct use of an incorrectly determined number of moles of I_2		
	$(\% \text{ yield} =) \frac{6.29}{7.975} \times 100$	allow correct use of an incorrectly determined theoretical mass of ZnI_2	1	
	$= 78.871 \text{ (\%)}$		1	
	$= 78.9 \text{ (\%)}$	allow an answer correctly rounded to 3 significant figures from an incorrect calculation which uses both mass values in the question	1	
	alternative approach 1:			
	$\left(\text{moles I}_2 = \frac{6.35}{254} =\right) 0.025 \text{ (1)}$			
	$\left(\text{moles ZnI}_2 = \frac{6.29}{319} =\right) 0.019717868 \text{ (1)}$			
	$(\% \text{ yield} =) \frac{0.019717868}{0.025} \times 100 \text{ (1)}$	allow correct use of an incorrectly determined number of moles of I_2 and/or ZnI_2		
	$= 78.871 \text{ (\%) (1)}$			
	$= 78.9 \text{ (\%) (1)}$	allow an answer correctly rounded to 3 significant figures from an incorrect calculation which uses both mass values in the question		

	alternative approach 2: $\left(\text{moles ZnI}_2 = \frac{6.29}{319} = \right) 0.019717868 \quad (1)$ (moles I₂ reacted = 0.019717868 mass I₂ reacted = 0.019717868 × 254 =) 5.0083 (g) (1) (% yield =) $\frac{5.0083}{6.35} \times 100 \quad (1)$ = 78.871 (%) (1) = 78.9 (%) (1)	allow correct use of an incorrectly determined number of moles of ZnI₂ allow correct use of an incorrectly determined mass of I₂ reacted allow an answer correctly rounded to 3 significant figures from an incorrect calculation which uses both mass values in the question		
Total Question 9				11