GCSE
CHEMISTRY

8462/2F – PAPER 2 FOUNDATION TIER

Mark scheme

8462

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Version/Stage: 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 Assessment Writer.

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.

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 his or her 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.

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**. Different terms in the mark scheme are shown by a / ; 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 error / 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 planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, 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. Full marks can, however, be given for a correct numerical answer, without any working shown.

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

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

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **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 <u>not</u> 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.

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 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.

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.

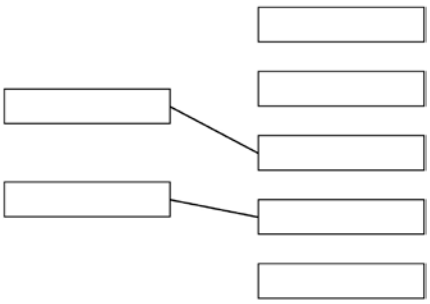
The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine 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.

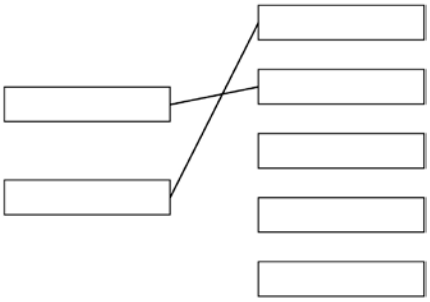
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	reactant		1	AO1 4.6.2.1
01.2	reversible		1	AO1 4.6.2.1
01.3	blue	allow shades of blue, eg pale blue	1	AO1 4.6.2.2
01.4	1.6 (g)		1	AO2 4.6.2.2
01.5	$\frac{0.9}{2.5} \times 100$ = 36 (%)	an answer of 36 (%) scores **2** marks	1 1	AO2 4.6.2.2
01.6		copper sulfate – $CuSO_4$ water – H_2O	1 1	AO2 4.1.1.1 AO1 4.1.1.1
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	$C_{12}H_{26}$		1	AO2 4.7.1.4
02.2	alkane		1	AO2 4.7.1.1
02.3	air	allow atmosphere	1	AO2 4.9.3.1
02.4		particulates – global dimming sulfur dioxide – acid rain	1 1	AO1 4.9.3.2
02.5	carbon dioxide carbon monoxide		1 1	AO1 4.7.1.3 4.9.3.1
02.6	develop fuel efficient engines use electric cars		1 1	AO3 4.9.3.1
Total			**9**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>03.1</td><td>
<table>
<tr><th>property</th><th>J</th><th>K</th></tr>
<tr><td>density in g/cm^3</td><td></td><td></td></tr>
<tr><td>melting point in °C</td><td></td><td>✓</td></tr>
<tr><td>flame resistance</td><td></td><td>✓</td></tr>
<tr><td>water absorption</td><td>✓</td><td></td></tr>
</table>
</td><td>three correct = 2 marks

one or two correct = 1 mark</td><td>2</td><td>AO3
4.10.1.1
4.10.3.3</td></tr>
<tr><td>03.2</td><td>$\frac{1.4 \times 6.0}{0.90}$

= 9.3 (kg)</td><td>an answer of 9.3(333…)(kg) scores 2 marks

allow 9.3(333...)(kg)</td><td>1

1</td><td>AO2
4.10.1.1
4.10.3.3</td></tr>
<tr><td>03.3</td><td>polymer L will not melt</td><td></td><td>1</td><td>AO3
4.10.3.3</td></tr>
<tr><td>03.4</td><td>polymers are more hard-wearing</td><td></td><td>1</td><td>AO3
4.10.1.1</td></tr>
<tr><td>03.5</td><td>any two from:
• (wool / sheep) renewable
• (wool) will not run out
• (crude oil) non-renewable
• (crude oil) will run out</td><td>allow wool grows back, etc

ignore (wool is) readily available

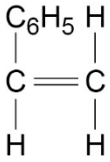
allow finite

ignore references to cost

ignore properties from tables 1 and 2</td><td>2</td><td>AO2
4.10.1.1</td></tr>
<tr><td>Total</td><td></td><td></td><td>8</td><td></td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	bar to 0.3 g bar labelled copper	 allow Cu	1 1	AO2 4.10.3.2
04.2	(£) 57	allow (£) 57.00	1	AO2 4.10.3.2
04.3	 $\frac{22}{9} \times 1.9$ = 4.6 (g)	an answer of 4.6(4444) (g) scores **2** marks allow an answer of 4.6(4444) (g)	 1 1	AO2 4.10.3.2
04.4	(9 carat gold is) any **two** from: • harder • less expensive • aesthetic reasons	allow converse arguments about 24 carat or pure gold allow stronger or more durable or less malleable allow cheaper allow references to colour ignore references to finite resources	 2	AO1 AO3 4.2.2.7 4.10.3.2
04.5	any **three** from: • copper ores will run out • landfill sites running out • less energy used • mining causes pollution • copper from copper ore more expensive	 allow copper ores scarce allow reduces waste allow produces less carbon dioxide or an implication e.g. global warming allow a specific pollution resulting from mining, eg noise, eyesore, damage to environment allow recycled copper is cheaper	3	AO1 AO3 4.10.1.4 4.10.2.2
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	crush the flower use more flowers		1 1	AO3 4.8.1.3
05.2	the start line is drawn in ink uses water as the solvent		1 1	AO3 4.8.1.3
05.3	flower A contains a single pure colour the colour in flower C is a mixture		1 1	AO3 4.8.1.3
05.4	$\frac{7.2}{9.0}$ = 0.8	an answer of 0.8 scores **2** marks ignore units	 1 1	AO2 4.8.1.3
Total			**8**	

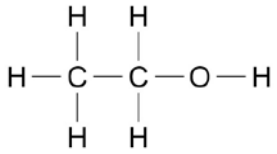
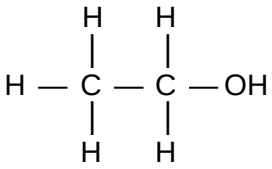
Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1			1	AO2 4.7.3.1
06.2	polymerisation		1	AO2 4.7.3.1
06.3	monomers many polymers	must be in this order	1 1 1	AO1 4.7.3.1
06.4	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.		3–4	AO3
	Level 1: Relevant features are identified and differences noted.		1–2	AO2
	No relevant content		0	
	Indicative content for coated paper cups – accept converse for poly(styrene) **advantages** • produced from a renewable resource • biodegradable so breaks down **disadvantages** • higher energy costs • greater use of fossil fuels and consequent pollution • not recyclable so uses landfill			4.10.1.1 4.10.2.1
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	83 (cm^3)	allow 83.0 / 83.00	1	AO2 4.6.1.2
07.2	mass of magnesium powder temperature of hydrochloric acid		1 1	AO1 4.6.1.2
07.3	 $\frac{(46 + 47 + 49)}{3}$ = 47 (cm^3) (2 sf)	an answer of 47 (cm^3) scores **2** marks allow 47.3(333) (cm^3) for **1** mark an answer of 43 (cm^3) scores **1** mark	 1 1	AO2 4.6.1.1 4.6.1.2
07.4	all points plotted correctly (inc 0,0)	allow a tolerance of ± ½ a square allow ecf from question **07.3** ignore line allow **1** mark for four points plotted correctly	2	AO2 4.6.1.1 4.6.1.2
07.5	 $\frac{80}{50}$ = 1.6 (cm^3/s)	an answer of 1.6 (cm^3/s) scores **2** marks allow 80 ± 2 allow 1.60 ± 0.04	 1 1	AO2 4.6.1.1
07.6	rate is greatest at start (then) rate decreases reaction stops	allow rate is faster at start allow (then) rate slows down	1 1 1	AO2 4.6.1.1 4.6.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	there are more particle collisions each second there are more particles in the same volume		1 1	AO1 4.6.1.3
07.8	(gas is) not carbon dioxide	ignore does not react with limewater	1	AO3 4.8.2.3
07.9	hydrogen pop sound	allow H_2	1 1	AO1 4.8.2.1
Total			**17**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	yellow	allow orange allow orange-yellow	1	AO1 4.8.3.1
08.2	copper (ion)	allow Cu^{2+} allow copper (II) allow barium (ion) allow Ba^{2+}	1	AO1 4.8.3.1
08.3	(flame) colours are masked	allow (flame) colours mix / blend allow only see one colour allow cannot see two colours at once ignore hard to distinguish	1	AO1 4.8.3.1
08.4	Li^+ Na^+		1 1	AO2 4.8.3.7
08.5	bromide (ion)	allow Br^- ignore bromine	1	AO1 4.8.3.4
08.6	add barium chloride (solution) add hydrochloric acid white precipitate produced	allow barium nitrate (solution) allow nitric acid allow acidified do **not** accept sulfuric acid dependent on use of a barium compound	1 1 1	AO1 4.8.3.5
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	formulation		1	AO1 4.8.1.2
09.2	$\frac{23.3}{265.5 + 23.3 + 3.0 + 1.5}$ (× 100) = 7.9 (%)	an answer of 7.9 (%) scores **2** marks allow $\frac{23.3}{293.3}$ (× 100) allow 7.944084555 (%) rounded correctly	1 1	AO2 4.8.1.2
09.3	to deter consumption / drinking (by people)		1	AO3 4.7.2.3
09.4	any **one** from: • fuel • solvent • antiseptic	do **not** accept as an alcoholic drink allow specific uses eg • fuel additive • cleaning products • hand-sanitisers	1	AO2 4.7.2.3
09.5	ferment(ation) add yeast anaerobic (conditions) **or** warm	ignore distillation allow in the absence of oxygen allow a temperature value in range 5 – 45 °C inclusive allow room temperature ignore hot / heat ignore high temperature	1 1 1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6		allow 	1	AO1 4.7.2.3
09.7	hydrogen	allow H_2	1	AO1 4.7.2.3
09.8	oxidising (agent)	allow permanganate / dichromate ions allow [O] ignore oxygen	1	AO1 4.7.2.3
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	hydrogen	allow H_2	1	AO1 4.10.4.1
10.2	450 °C 200 atm / atmospheres	allow values in the range 400– 500 °C allow values in the range 150– 250 atm / atmospheres allow **1** mark if both values within range but no units given	1 1	AO1 4.10.4.1
10.3	ammonia has a higher boiling point	allow the other gases have lower boiling points ignore references to melting point	1	AO3 4.10.4.1

Question	Answers		Mark	AO / Spec. Ref.
10.4	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.		5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.		3–4	AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1–2	AO1
	No relevant content		0	
	Indicative content **changes** • carbon dioxide has decreased • oxygen has increased **processes** • volcanic activity released water vapour • the water vapour condensed to form oceans • carbon dioxide dissolved in oceans • carbonates produce sediments • carbon locked up in sedimentary rocks • algae and plants evolved / appeared • algae / plants absorbed carbon dioxide • by photosynthesis • which also released oxygen • carbon locked up in fossil fuels			4.9.1.2 4.9.1.3 4.9.1.4
10.5	any **one** from: • occurred 4.6 billion years ago • limited or no evidence	allow any indication of billions of years allow limited or no proof ignore there was nobody there	1	AO1 4.9.1.2
Total			**11**	