
GCSE SCIENCE A / CHEMISTRY

CH1FP

Mark scheme

4405 / 4402

June 2014

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 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

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- 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

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

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 e.c.f. 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 Ignore / Insufficient / Do not allow

Ignore or insufficient are 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.

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

Quality of Written Communication and levels marking

In Question 7(b) students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

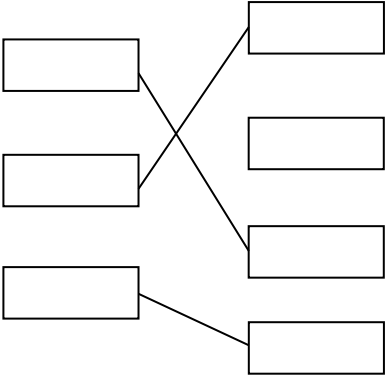
- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
1(a)(i)	a proton		1	1 / 1.1.1d	A
1(a)(ii)	nucleus		1	1 / 1.1.1c	A
1(a)(iii)	12 4	order must be correct	1 1	2 / 1.1.1g	G
1(b)(i)	5 / five (%)		1	1 / 1.4.3a	G
1(b)(ii)	Carbon dioxide>global warming Sulfur dioxide>acid rain Water>no pollution 		1 1 1	1 / 1.4.3a/c	G
Total			8		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
2(a)	argon / Ar		1	1 / 1.1.2b	G
2(b)(i)	0		1	1 / 1.1.2b	A
2(b)(ii)	unreactive		1	1 / 1.1.2b	A
2(c)(i)	94.96(%)		1	2 / 1.7.2c	E
2(c)(ii)	any two from: <ul style="list-style-type: none"> plants or photosynthesis absorbed in oceans / seas <u>locked</u> up in (sedimentary) rocks <u>locked</u> up in fossil fuels 	allow oceans store or take in or dissolve carbon dioxide	2	2 / 1.7.2f/g/h	E
Total			6		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
3(a)(i)	any one from: <ul style="list-style-type: none"> destruction of habitats fewer plants/trees to absorb carbon dioxide dust / noise / air / visual (<i>pollution</i>) more traffic 	<i>allow breathing problems</i>	1	3 / 1.2	E
3(a)(ii)	any one from: <ul style="list-style-type: none"> provides employment local business make more profit new transport links 	ignore future use of quarry	1	3 / 1.2	E
3(a)(iii)	(rain water is) acidic		1	1 / 1.2.1f	E
3(b)(i)	1.2(g)		1	2 / 1.2.1b	E
3(b)(ii)	1.4(g)	allow ecf from (b)(i)	1	2 / 1.2.1b	E view with (b)(i)
3(b)(iii)	any one from: <ul style="list-style-type: none"> temperature of the flame varied different purity of the limestone incorrect measurement of mass heated for different times 	allow flame was too hot or not hot enough	1	3 / 1.2.1b	E
3(c)(i)	decomposition		1	1 / 1.2.1b	G
3(c)(ii)	2.2(g)		1	2 / 1.1.3c	E

3(c)(iii)		test must be correct to gain second mark		1 / 1.2.1e	E
	limewater turns cloudy	allow turns milky or white (precipitate)	1 1		
Total			10		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
4(a)	hydrocarbons or hydrocarbon		1	1 / 1.4.1c	G
4(b)(i)	distillation		1	1 / 1.4.2b	G
4(b)(ii)	evaporation		1	2 / 1.4.2b	G
4(b)(iii)	condensation		1	2 / 1.4.2b	G
4(c)(i)	bond		1	1 / 1.4.2a	G
4(c)(ii)	(C ₆ H) ₁₄		1	2 / 1.4.2a	G
4(c)(iii)	cracking		1	1 / 1.5.1a	G
4(d)(i)	poly(butene)	allow with or without brackets	1	1 / 1.5.2a	E
4(d)(ii)	Advantage=energy is released	do not accept more than one tick in the advantage column	1	3 / 1.5	G
	Disadvantage=carbon dioxide is produced	do not accept more than one tick in the disadvantage column	1		
Total			10		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
5(a)(i)	economical		1	1 / 1.3.1a	A
5(a)(ii)	phytomining		1	1 / 1.3.1g	A
5(a)(iii)	carbon dioxide		1	1 / 1.3.1d/f	A
5(b)(i)	copper / Cu iron sulfate / FeSO ₄		1	2 / 1.3.1h	E
			1		
5(b)(ii)	copper/ ions have a positive charge	it = copper ions allow copper ions have a different charge accept copper / ions are free to move accept to gain electrons accept copper / ions are attracted to the negative electrode or opposite charges attract	1	1 / 1.3.1h	E
5(c)	any two from: <ul style="list-style-type: none"> copper ores are limited / running out copper can be recycled copper can be reused copper is expensive landfill sites are filling up copper compounds are toxic 	ignore not biodegradable or does not decay allow copper is running out allow copper is toxic	2	3 / 1.3.1j	E
Total			8		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
6(a)(i)	add bromine (water) <i>to the oil</i> <i>one drop at a time / dropwise or</i> <i>count / record number of drops</i> until the bromine (water) no longer decolourises or until bromine water remains orange	<i>it = bromine water</i> <i>allow shake / mix / stir</i> <i>ignore clear</i>	1 1 1	1+2 / 1.6.3a	E
6(a)(ii)	A 2 anomalous result or explanation	both need to be correct <i>allow A 17</i> <i>ignore does not fit pattern / trend</i> <i>independent marking points</i>	1 1	3 / 1.6.3a	E
6(a)(iii)	any one from: <ul style="list-style-type: none"> temperature concentration of bromine water (same) <i>dropper / pipette</i> 	<i>ignore references to time</i> <i>allow same bromine water</i> <i>allow (same) drop size</i>	1	3 / 1.6.3a	E

6(b)	<p>any three from:</p> <ul style="list-style-type: none"> • A's oil has more unsaturated fat (than Vegio) or has the most unsaturated fat • B's oil has more unsaturated fat (than Vegio) • C's oil has less unsaturated fat (than Vegio) or has the least unsaturated fat • D's oil has less unsaturated fat (than Vegio) • Vegio is in 3rd position 	<p><i>comparison must be to Vegio</i> allow <i>healthier or better (for you)</i> for more unsaturated fat <i>ignore references to bromine water</i></p> <p><i>allow <u>only</u> A and B have more unsaturated fat than Vegio or <u>only</u> C and D have less unsaturated fat than Vegio for 3 marks</i></p>	3	3 / 1.6.3a	E
Total			9		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
7(a)(i)	reaction with water / steam	allow add water / steam (to produce ethanol) allow H ₂ O or hydrogen oxide for water ignore mix	1	1 / 1.5.3a	E
7(a)(ii)	filter / decant (to remove the yeast)	allow answers in either order accept description of decanting ignore sieve	1	2 / 1.5.3b	E
	(fractional) distillation / distil	accept evaporation then condensation	1		

7(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a ‘best-fit’ approach to the marking.				1+2+3 / 1.4.3e	E
0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)		
No relevant content	There is a stated advantage or disadvantage of using biodiesel or petroleum diesel.	There is a stated advantage or disadvantage of using biodiesel or petroleum diesel with a linked consequence.	There is at least one stated advantage and at least one stated disadvantage of using biodiesel or petroleum diesel with a linked consequence for each.		
Examples of points made in the response could include: Advantages of biodiesel: <ul style="list-style-type: none"> • Produces less carbon dioxide • Produces no sulfur dioxide • Produces less particulates • Sustainable / renewable • Growing crops absorb carbon dioxide • Carbon neutral • Produces less acid rain • Conserves the limited amount of petroleum diesel Disadvantages of biodiesel: <ul style="list-style-type: none"> • Produces more nitrogen oxides • Deforestation for land • Destruction of habitats for land • Uses land that could be used for food crops • Creates food shortages • Crops are not reliable 					
Total			9		