

AQA CERTIFICATE

SCIENCE: DOUBLE AWARD

Chemistry Paper 2

Higher Tier

8404/C/2H

Mark scheme

8404

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 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

- 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.

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 are 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 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.

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.

Question	Answers	Extra information	Mark	AO/spec ref
1(a)(i)	80		1	AO2
	55		1	3.3a
1(a)(ii)	25	allow ecf from (a)(i)	1	AO2 3.3a
1(a)(iii)	31(.25 or .3)	do not accept 31.2 if answer incorrect 25/80 or 25/80 x 100 scores 1 mark allow ecf from answer to (a)(i) and/or answers to (a)(ii)	2	AO2 3.3a
1(a)(iv)	any value in range 20–22		1	AO1 3.1a
1(a)(v)	systematic		1	AO1 3.3a
1(a)(vi)	because air was also in the boiling tube / tubes	allow not all the air was measured for 1 mark	2	AO3 3.3a
1(b)(i)	keeps out air and / or water	allow acts as a barrier must have the idea of preventing contact, not just the idea of preventing reaction	1	AO1 3.3b
1(b)(ii)	sacrificial protection	allow <i>description</i> of sacrificial protection <i>e.g. zinc reacts (instead of iron)</i> ignore zinc rusts	1	AO1 3.3b
	because zinc is more reactive (than iron)		1	
1(b)(iii)	Food might react with zinc		1	AO2 / AO3
	Tin is less reactive than zinc		1	3.3b
Total			14	

Question	Answers	Extra information	Mark	AO/spec ref
2(a)(i)	(Zinc).....Yes, Yes	both correct	1	2AO1 / 2AO2
	(Silicon dioxide)Giant covalent / Macromolecular	<i>allow covalent lattice</i>	1	2.2
	(Sodium chloride)No, Yes	both correct	1	
	(Ethanol)... Simple covalent / (Small) molecule(s) / Molecular		1	
2(a)(ii)	Graphite	allow silicon	1	Ao2 2.2f, 2.2i
2(a)(iii)	electrons are delocalised	allow are free <i>ignore 'sea of electrons'</i>	1	AO1 5.3b, 5.3c
	so (electrons) can move through the structure		1	
	(this movement of electrons) transfers (heat) energy	allow pass the energy on	1	
2(a)(iv)	forces between molecules or intermolecular forces are weak or need little energy to break	covalent / ionic bonds or bonds between atoms broken = 0 marks		AO1 2.2d
		allow intermolecular bonds	1	
			1	
2(b)(i)	carbon / C		1	AO1 2.2j
2(b)(ii)	spherical / round molecules	allow weak intermolecular forces / bonds	1	AO3 2.2j
	roll	allow slide / slip or move past each other	1	
2(b)(iii)	reinforcing / strengthening material	<i>ignore reference to flexibility / density / shock absorbing</i>	1	AO1 2.2j
Total			14	

Question 3 continued

Question	Answers	Extra information	Mark	AO/spec ref
3(c)(ii)	<p>as mass increases more (<i>heat</i>) energy is absorbed or there is a greater (<i>heat</i>) energy change</p> <p>because it reacts with more acid or because there is more <i>reaction</i></p> <p>after 5 g no further reaction</p> <p>because all acid used up or excess potassium hydrogencarbonate</p>	allow reaction finished	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	2AO2 / 2AO3 9c
3(c)(iii)	<p>Either</p> <p>yes because there is a clear trend</p> <p>but repeats should have been taken (and an average calculated)</p> <p>and <i>a / some</i> points are anomalous</p> <p>or</p> <p>no because although there is a clear trend</p> <p>repeats should have been taken (and an average calculated)</p> <p>and <i>a / some</i> points are anomalous</p>	<p>allow all points lie on or close to the line(s)</p> <p>allow all points lie on or close to the line(s)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	AO3 9c
Total			17	

Question	Answers	Extra information	Mark	AO/spec ref
4(a)(i)	steam or water vapour or condensation on tube or (colourless) liquid on tube or crystals change to a powder		1	AO1 9d
4(a)(ii)	Reversible	allow can go both ways	1	AO1 1.3h, 9d
4(a)(iii)	increase	allow goes up or gets higher / rises do not accept gets bigger	1	AO1 9d
4(b)	to make sure <i>all the water is driven off</i>	<i>to make sure / to see if the reaction has finished scores 1 mark</i>	2	AO3 9d
4(c)(i)	3.19	correct answer with or without working scores 2 marks if no answer, or answer incorrect allow $(34.24 - 30.62 =) 3.62$ or $33.81 - 30.62$ for 1 mark	2	AO2 / AO3 9d
4(c)(ii)	3.34	correct answer with or without working scores 2 marks if no answer, or answer incorrect allow $37.15 - 33.81$ or $(37.15 - 30.62) = 6.53$ or $(37.15 - 34.24) = 2.91$ for 1 mark	2	AO2 / AO3 9d

Question 4 continues on the next page

Question 4 continued

Question	Answers	Extra information	Mark	AO/spec ref
4(d)	2.9(0)	correct answer with or without working scores 2 marks if no answer, or answer incorrect allow 2.8(0) or (2.89 + 2.91) / 2 for 1 mark	2	AO3 9d
4(e)(i)	0.016(2)	correct answer with or without working scores 2 marks if no answer, or answer incorrect allow 1.94 / 120 for 1 mark	2	AO2 1.3c
4(e)(ii)	7 alternative using data provided 6	correct answer with or without working scores 2 marks unless obtained from 120 / 18 if no answer, or answer incorrect allow 0.114 / 0.016 or 7.1(25) for 1 mark allow ecf from (e)(i) correct answer with or without working scores 2 marks unless obtained from 120 / 18 if no answer, or answer incorrect allow 0.114 / 0.018 or 6.3(33) for 1 mark	2	AO2 1.3d
Total			15	