



General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Mark Scheme

2012 examination – January series

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

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MARK SCHEME

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 lines 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	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, 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, as shown in the column 'answers', 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;

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.

CHY2F**Question 1**

question	answers	extra information	mark
1(a)	electron		1
1(b)(i)	5		1
1(b)(ii)	boron	accept B	1
1(c)(i)	11		1
1(c)(ii)	neutrons		1
Total			5

Question 2

question	answers	extra information	mark
2(a)	reversible		1
2(b)	(from blue) to pink	do not accept incorrect initial colour	1
2(c)	sensible answers such as: <ul style="list-style-type: none"> • stop water reaching papers • water (vapour) in air 	accept stop entry of moisture / wet / dampness / condensation ignore references to toxicity of cobalt chloride	1
Total			3

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Question 3

question	answers	extra information	mark
3(a)(i)	10		1
3(a)(ii)	OH ⁻		1
3(b)(i)	air		1
3(b)(ii)	particles move faster		1
	particles collide more often		1
3(b)(iii)	catalyst(s)		1
3(c)	liquid		1
Total			7

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Question 4

question	answers	extra information	mark
4(a)(i)	A		1
4(a)(ii)	E		1
4(b)(i)	insoluble precipitation		2
4(b)(ii)	filtration	accept decant or centrifuge	1
4(b)(iii)	hydrochloric acid		1
4(c)(i)	melt	allow add to / dissolve in water allow heat until liquid allow turn it to liquid / make it molten ignore heat	1
4(c)(ii)	they are positive or opposite charges or opposites attract	do not accept electrodes attracting do not accept positive electrons	1
4(c)(iii)	chlorine	accept Cl ₂ do not accept chloride	1
Total			9

CHY2F**Question 5**

question	answers	extra information	mark
5(a)(i)	C		1
5(a)(ii)	C or D		1
5(a)(iii)	A		1
5(b)	covalent		1
5(c)	layers		1
	can slide / move over each other	accept are weakly bonded (owtte) allow no bonds between layers ignore slip / rub	1
Total			6

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Question 6

question	answers	extra information	mark
6(a)	any one from: <ul style="list-style-type: none"> no method / electrolysis / equipment / technology aluminium is a very reactive metal high melting point potassium had not been discovered 	allow 'didn't know how to' or 'no knowledge' allow 'couldn't heat it enough'	1
6(b)	because <u>others</u> / <u>scientists</u> / <u>they</u> could not repeat the experiment or <u>others</u> / <u>they</u> could not obtain the same results	ignore he could not repeat the experiment	1
6(c)	reaction is endothermic or reaction <u>takes in</u> heat / energy	accept activation energy ignore rate / high temperature ignore bonds broken	1
6(d)	(aluminium chloride + potassium) → aluminium + potassium chloride	in either order accept correct formulae ignore metal ignore balancing	1
6(e)	when tested it had the properties of a metal properties were different (from other known metals)	accept a test for a metal property eg conductivity / reaction with acid accept properties compared with other metals	1 1
Total			6

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Question 7

question	answers	extra information	mark
7(a)(i)	40	correct answer with or without working or incorrect working if the answer is incorrect then evidence of $24 + 16$ gains 1 mark ignore units	2
7(a)(ii)	60	correct answer with or without working or incorrect working if the answer is incorrect then evidence of $24/40$ or $24/(i)$ gains 1 mark ecf allowed from part(i) ie $24/(i) \times 100$ ignore units	2
7(a)(iii)	15	ecf allowed from parts(i) and (ii) $24/(i) \times 25$ or $(ii)/100 \times 25$ ignore units	1
7(b)(i)	any two from: <ul style="list-style-type: none"> error in weighing <u>magnesium</u> / <u>magnesium oxide</u> loss of magnesium oxide / magnesium not all of the magnesium has reacted 	ignore gas is lost allow some magnesium oxide left in crucible allow they lifted the lid <u>too much</u> allow loss of reactants / products allow not heated enough allow not enough oxygen / air	2

Question 7 continues on the next page.....

CHY2F**Question 7 continued**

question	answers	extra information	mark
7(b)(ii)	any two from: <ul style="list-style-type: none"> • check that the result is not anomalous • to calculate a mean / average • improve the reliability • <u>reduce</u> the effect of errors 	ignore fair test allow improve the accuracy of the mean / average allow make it reliable	2
Total			9

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