



General Certificate of Secondary Education

**Additional Science 4463 /
Chemistry 4421**

CHY2F Unit Chemistry 2

Mark Scheme

2011 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 candidates' 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 candidates' 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 candidates' 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 candidates 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)

Candidate	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)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate 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)	increases		1
1(b)	the reaction is reversible		1
1(c)	A liquid		1
1(d)	recycled / reused (owtte)	accept returned to pump / start	1
Total			4

CHY2F
Question 2

question	answers	extra information	mark
2(a)	any two from <ul style="list-style-type: none">• shorter / quicker soaking time• takes less time / quicker to dry or faster evaporation• dissolves quicker / better in methanol	assume it = methanol allow converse for water allow it is quicker	2
2(b)(i)	CH ₄ O		1
2(b)(ii)	covalent		1
2(c)	it is made of small molecules		1
Total			5

CHY2F
Question 3

question	answers	extra information	mark
3(a)	diagram A		1
3(b)	the atoms can slide over each other.		1
	the atoms are in layers		1
3(c)(i)	sulfuric		1
3(c)(ii)	bubbles are produced		1
	the magnesium disappears		1
3(c)(iii)	crystallisation		1
Total			7

CHY2F**Question 4**

question	answers	extra information	mark
4(a)	high melting point		1
	not flammable		1
4(b)(i)	all		1
4(b)(ii)	two		1
4(b)(iii)	covalent		1
4(b)(iv)	very strong		1
Total			6

CHY2F
Question 5

question	answers	extra information	mark
5(a)(i)	increase		1
5(a)(ii)	energy is given out to the surroundings		1
5(b)(i)	NO	allow 2NO ignore nitrogen oxide do not allow equations	1
5(b)(ii)	harmful / poisonous (owtte)	allow dangerous ignore reference to pollution / global warming do not accept references to ozone layer	1
5(c)	a catalyst can speed up a chemical reaction		1
	different reactions need different catalysts		1
5(d)(i)	<u>smaller</u>	accept less / tiny / very small allow 10^{-9} do not allow small unless qualified	1
5(d)(ii)	reduce cost (owtte) or save resources / raw materials (owtte)	ignore references to energy	1
Total			8

CHY2F

Question 6

question	answers	extra information	mark
6(a)	the ions can <u>move</u> / <u>travel</u> / <u>flow</u> / are <u>free</u> or the ions <u>carry</u> the charge / current	accept particles / they for ions allow delocalised ions ignore delocalised / free electrons ignore references to collisions accept converse with reference to solid ignore ions carry electricity	1
6(b)	any one from: • because they are negative / anion • opposite charges / attract	allow Cl ⁻ ignore chlorine	1
6(c)	13		1
6(d)(i)	reasonable attempt at straight line which misses the anomalous point	must touch all five crosses do not allow multiple lines	1
6(d)(ii)	40	ignore 2.2	1

Question 6 continues on the next page

CHY2F

Question 6

question	answers	extra information	mark
6(d)(iii)	any two sensible errors from: <ul style="list-style-type: none"> • gas escapes • weighing error • error in measuring (volume / amount) of hydrogen • error in measuring (volume / amount) of water • incorrect concentration • timing error • change in voltage / current • change in temperature • recording / plotting error 	ignore systematic / human / apparatus / zero / experimental / random / measurement / reading errors unless qualified allow NaCl not measured correctly allow error in measuring volume / scale for 1 mark if neither hydrogen or water mentioned allow NaCl not fully dissolved or spilled or impure allow faulty power supply	2
6(d)(iv)	any one from: <ul style="list-style-type: none"> • repeat the experiment • results compared with results from /other students / other groups / other laboratories / internet / literature. • results compared with another method 	ignore 'do more tests'	1
6(d)(v)	increases owtte	allow directly proportional or positive correlation allow rate / it is faster / quicker	1
Total			9

CHY2F

Question 7

question	answers	extra information	mark
7(a)(i)	65	correct answer with or without working = 2 marks if answer incorrect evidence of (81 – 16) for 1 mark ignore units	2
7(a)(ii)	zinc	accept error carried forward from (a)(i) allow correct symbol answer given should be element / metal closest to their answer do not allow compounds	1
7(b)(i)	<ul style="list-style-type: none"> • it loses electrons • three electrons 	sharing / covalency = max 1 mark	1
			1
7(b)(ii)	8 electrons shown in second shell.	accept dots / crosses / mixture of dots and crosses / e electrons do not need to be paired do not allow extra electrons in first shell	1
Total			6