



General Certificate of Secondary Education

Additional Science 4463 / Chemistry 4421

CHY2F Unit Chemistry 2

Mark Scheme

2012 examination – June 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	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, 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.

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Question 1

question	answers	extra information	mark
1(a)(i)	the temperature at start	ignore reference to bubbles / heat	1
	the temperature at end	(measure) the temperature rise / change = 2 marks (measure) the temperature 1 mark	1
1(a)(ii)	temperature would increase	allow it gets hot(ter) / warm(er) or heat given off allow energy released / transferred	1
1(b)	any one from: <ul style="list-style-type: none"> • volume of acid • temperature of acid • size of magnesium ribbon • surface area of magnesium 	allow amount allow liquid allow volume / mass / amount ignore size of test tube and reference to water	1
1(c)(i)	(Test tube) B		1
1(c)(ii)	produces bubbles faster or faster rate of reaction	accept more bubbles allow most reactive	1
1(d)	The particles move faster		1
	The particles collide more often		1
Total			8

CHY2F**Question 2**

question	answers	extra information	mark
2(a)(i)	B		1
2(a)(ii)	A		1
2(a)(iii)	C		1
2(b)	D and E		1
2(c)	electron		1
Total			5

CHY2F**Question 3**

question	answers	extra information	mark
3(a)	gases		1
	white		1
	solid		1
	ammonium chloride		1
3(b)	reversible	allow phonetic spelling allow goes both / two / either way(s)	1
Total			5

CHY2F**Question 4**

question	answers	extra information	mark
4(a)	carbon		1
4(b)	each atom is joined to four other atoms		1
	It has a giant structure		1
4(c)	very small		1
Total			4

CHY2F**Question 5**

question	answers	extra information	mark
5(a)(i)	hydrochloric		1
5(a)(ii)	insoluble		1
	filtration		1
5(a)(iii)	crystallisation		1

Question 5 continues on the next page . . .

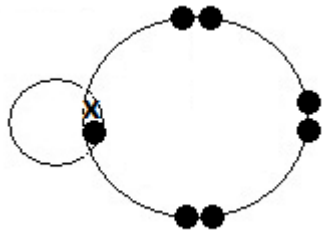
CHY2F

Question 5 cont'd..

question	answers	extra information	mark
5(b)	any four from: <ul style="list-style-type: none"> • calcium atom reacts with <u>2</u> <u>chlorine atoms</u> • calcium atoms <u>lose</u> electrons • lose <u>two</u> electrons • chlorine atoms gain electrons • gain <u>one</u> electron 	any reference to incorrect bonding = max 3 accept calcium ion is formed accept calcium has a 2+ charge / calcium ion has a 2+ charge allow Ca ²⁺ accept chloride ion formed accept chlorine / chloride has a negative charge / is a negative ion/ is a negative particle allow Cl ⁻ if no other marks awarded allow ionic bonding or complete outer shell for 1 mark	4
Total			8

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Question 6

question	answers	extra information	mark
6(a)	any one from: <ul style="list-style-type: none"> • they are negative / anions • they are attracted • they are oppositely charged 	allow Cl^- ignore atoms / chlorine do not accept chloride ions are negative electrodes	1
6(b)	hydrogen is less reactive than sodium		1
6(c)	hydroxide (ions) / OH^-	ignore OH do not accept NaOH / sodium hydroxide	1
6(d)(i)		allow any combination of dots or crosses ignore chemical symbols	1
6(d)(ii)	covalent	allow close spelling errors apply list principle	1
6(d)(iii)	hydrogen (ion) / H^+	ignore (aq) / H do not accept hydrochloric acid / HCl apply list principle	1
Total			6

CHY2F**Question 7**

question	answers	extra information	mark
7(a)	1.86	ignore units / 1.9	1
7(b)	use a balance which weighs to more decimal places or use more sensitive balance	accept (use a measuring cylinder with) smaller (scale) divisions / intervals allow reference to more decimal places allow smaller units / scale	1
7(c)(i)	45.8(3333333)	correct answer gains 2 marks with or without working ignore units / 46 if the answer is not correct then evidence of: (45.4 + 46.3 + 45.8) ÷ 3 or 137.5 ÷ 3 or 47.25 / 47.3 / 47.2 gains 1 mark	2

Question 7 continues on the next page . . .

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Question 7 cont'd...

question	answers	extra information	mark
7(c)(ii)	any two from: <ul style="list-style-type: none"> • loss of gas or leak • error in measurement of volume of gas / gas in cylinder / 1 dm^3 • error in weighing the canister / gas at start • error in weighing the canister / gas at end • change in temperature • change in pressure 	ignore zero error / faulty equipment error in weighing the canister / gas = 1 mark allow incorrect measurement of temperature allow incorrect measurement of pressure if no other mark awarded allow error in weighing for 1 mark	2
7(c)(iii)	any one from: <ul style="list-style-type: none"> • check for anomalous results • to find the mean / average • (improve) reliability / make reliable 	ignore fair test / precise / valid or to check for errors / mistakes allow improve (accuracy of) <u>mean</u> / <u>average</u>	1
7(d)	44	correct answer gains 2 marks with or without working ignore units if the answer is incorrect evidence of $(3 \times 12) / 36$ and $(8 \times 1) / 8$ gains 1 mark	2
Total			9

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