



# **General Certificate of Secondary Education**

## **Science B 4462 / Chemistry 4421**

**CHY1F          Unit Chemistry 1**

### **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.

**CHY1F****Question 1**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>1(a)</b>	causes dust pollution		1
	increases traffic		1
<b>1(b)(i)</b>	it is soft	accept the layers of atoms can slide over each other ignore other properties	1
<b>1(b)(ii)</b>	contains chromium / nickel	allow contains other <u>metals</u>	1
<b>1(c)(i)</b>	an element		1
<b>1(c)(ii)</b>	hard		1
<b>1(c)(iii)</b>	is resistant to corrosion		1
<b>Total</b>			<b>7</b>

**CHY1F****Question 2**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>2(a)</b>	1 / one		1
	3 / three		1
<b>2(b)(i)</b>	air linked to nitrogen and oxygen		1
	quicklime linked to calcium oxide		1
	waste gases linked to nitrogen and carbon dioxide		1
<b>2(b)(ii)</b>	mixture burns / combusts	accept methane reacts with air / oxygen	1
	to provide energy / heat	accept as a fuel	1
<b>2(c)</b>	as a building material		1
	to make cement		1
<b>Total</b>			<b>9</b>

**CHY1F****Question 3**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>3(a)</b>	bar drawn correctly 78 – 80 (%)		1
<b>3(b)(i)</b>	(Mars has) no (green / living) plants / trees		1
<b>3(b)(ii)</b>	(argon) is unreactive / inert	accept argon is a noble gas ignore it is in Group 0	1
<b>3(c)</b>	(the amount of carbon dioxide has decreased because it has been) absorbed / used by (green / living) plants / trees <b>or</b> used for photosynthesis	accept dissolved / absorbed by oceans or locked up in fossil fuels / carbonate rocks	1
<b>3(d)</b>	the eruption of volcanoes		1
<b>Total</b>			<b>5</b>

**CHY1F****Question 4**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>4(a)(i)</b>	hydrocarbons	accept alkanes	1
<b>4(a)(ii)</b>	distillation		1
<b>4(b)(i)</b>	vaporising		1
<b>4(b)(ii)</b>	cracking		1
<b>4(c)</b>	B		1
<b>4(d)(i)</b>	new plastic products are made from the used plastic bags		1
<b>4(d)(ii)</b>	not biodegradable	accept does not decompose allow does not rot	1
<b>4(d)(iii)</b>	advantage – energy is released		1
	disadvantage – carbon dioxide is produced		1
<b>Total</b>			<b>9</b>



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## Question 5

question	answers	extra information	mark
5(a)(i)	a reasonable attempt at a smooth curve	allow a curve which is close to but does not necessarily touch all points	1
5(a)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>biodiesel is more <u>viscous</u> than petroleum diesel at all / lower temperatures</li> <li>biodiesel – as the temperature increases the <u>viscosity</u> decreases or vice versa</li> <li>petroleum diesel – the <u>viscosity</u> does not change</li> </ul>	allow thicker / thinner / runny for viscous  if no other mark awarded allow <b>1</b> mark for any correct conclusion based on time or rate of flow	2
5(a)(iii)	does not flow as easily (through pipes / engine)  <b>or</b>  needs a high temperature to flow	allow could form a solid / block pipes / engine at low temperatures  allow more difficult to vaporise / ignite ignore burning  ignore references to viscosity	1
5(b)(i)	global dimming	allow correct description	1
5(b)(ii)	56 (%)		1

Question 5 continues on the next page . . .

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## Question 5 cont'd...

question	answers	extra information	mark
5(b)(iii)	(increases) acid rain		1
	because there is <u>more</u> nitrogen oxide(s)	ignore sulfur dioxide  if no other mark awarded allow <b>1</b> mark for nitrogen oxide(s) given	1
5(b)(iv)	no	answer yes or no does not gain credit because the marks are for an explanation ignore references to petroleum diesel allow carbon for carbon dioxide	
	because carbon dioxide (26%) is released / produced		1
	this will <u>not</u> all be absorbed by photosynthesis / growing plants for biodiesel	accept growing plants / farming uses machinery / fossil fuels releases carbon dioxide	1
	<b>OR</b> yes  because although carbon dioxide (26%) is released / produced (1)  this was absorbed by photosynthesis / growing plants(for biodiesel) (1)	allow this will be absorbed by photosynthesis / growing plants for biodiesel	
<b>Total</b>			<b>10</b>

## CHY1F

## Question 6

question	answers	extra information	mark
6(a)	(improve) appearance	allow add colour  allow these food colourings have not been proven to cause hyperactive behaviour in young children  do <b>not</b> accept taste / flavour / preservatives ignore reference to E-numbers	1
6(b)	X		1
6(c)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• S contains six / 6 colourings</li> <li>• P contains five / 5 colourings</li> <li>• both S and P contain the same five / 5 colourings</li> <li>• both contain W <b>and</b> Y</li> <li>• both sweets (may) cause hyperactivity</li> <li>• neither contain X <b>and</b> Z</li> </ul>	if neither of first 2 bullet points given allow <b>1</b> mark for S contains more colours than P <b>or</b> converse        ignore unsafe	3
<b>Total</b>			<b>5</b>

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