



# **General Certificate of Secondary Education**

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

**CHY1F            Unit Chemistry 1**

### **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.

**CHY1F****Question 1**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>1(a)</b>	NN linked to element		1
	OCO linked to compound		1
<b>1(b)</b>	electron	must be correct order	1
	nucleus		1
<b>1(c)</b>	(reacts with) oxygen	must be names	1
	to produce water	accept hydrogen oxide allow steam	1
<b>Total</b>			<b>6</b>

**CHY1F****Question 2**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>2(a)(i)</b>	chromatography		1
<b>2(a)(ii)</b>	3 / three		1
<b>2(a)(iii)</b>	the colour / E104 is not on the same level as any of the colours in the food	accept E104 does not match	1
<b>2(b)(i)</b>	to improve the appearance of the food	ignore adds yellow / colour ignore taste / flavour	1
<b>2(b)(ii)</b>	further / or different tests (for harmful effects) <b>or</b> obtain more evidence (that it is harmful)	allow do a survey / study	1
<b>Total</b>			<b>5</b>

## CHY1F

## Question 3

question	answers	extra information	mark
3(a)(i)	bar drawn between 84 and 86		1
3(a)(ii)	sulfur dioxide linked to acid rain		1
	carbon particles linked to global dimming		1
3(b)(i)	any <b>one</b> from: <ul style="list-style-type: none"> <li>plants / trees <u>absorb</u> (carbon dioxide)</li> <li>coal '<u>locks up</u>' (carbon dioxide)</li> </ul>		1
3(b)(ii)	it <u>increases</u> the amount (of CO <sub>2</sub> )		1
	because carbon in coal (forms carbon dioxide)	accept because carbon / coal burns / reacts <u>with oxygen</u> (to produce CO <sub>2</sub> )	1
<b>Total</b>			<b>6</b>

**CHY1F****Question 4**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>4(a)</b>	(iron (steel) is) strong	allow abundant <b>or</b> easy to extract <b>or</b> cheap ignore other correct properties	1
<b>4(b)</b>	<u>less</u> dense  <u>more</u> abundant	allow low mass  accept copper is 'running out' allow copper is more expensive ignore other correct statements	1  1
<b>4(c)(i)</b>	C <sub>2</sub> H <sub>4</sub>		1
<b>4(c)(ii)</b>	double bond		1
<b>4(c)(iii)</b>	poly(ethene)		1
<b>Total</b>			<b>6</b>



## CHY1F

## Question 5

question	answers	extra information	mark
5(a)(i)	2.5(kg)	ignore units	1
5(a)(ii)	40% (cement) <b>and</b> Test 3  because it is anomalous or because it is much lower than the other two readings	ignore units	1
		accept value not used to calculate mean  ignore outlier	1
5(a)(iii)	as the percentage of cement increases the mass needed to break the sleeper increases	allow 'strength for 'mass needed' allow correct relationship using percentage of sand	1
5(a)(iv)	<u>volume/percentage</u> / <u>amount of</u> water	accept temperature	1
5(b)	any <b>two</b> from:  <ul style="list-style-type: none"> <li>• availability (of the raw materials)</li> <li>• cost of the raw materials</li> <li>• purity (of the raw materials)</li> </ul>		2
<b>Total</b>			<b>7</b>

## CHY1F

## Question 6

question	answers	extra information	mark
6(a)(i)	burning biodiesel releases CO <sub>2</sub>	use of carbon throughout = <b>max 1</b> ignore burning trees	1
	CO <sub>2</sub> is absorbed / used by the crops/plants (used to produce the biodiesel)	allow CO <sub>2</sub> absorbed / used by trees	1
6(a)(ii)	increases CO <sub>2</sub> / greenhouse effect <b>OR</b> less CO <sub>2</sub> is absorbed (from atmosphere)	allow use of carbon for carbon dioxide throughout accept causes global warming allow causes climate change ignore other correct effects	1
	because burning trees releases CO <sub>2</sub> <b>OR</b> because there is less photosynthesis	accept fewer trees to absorb CO <sub>2</sub> <b>or</b> crops / plants do not absorb as much CO <sub>2</sub> as trees ignore habitats / biodiversity if no other mark awarded global dimming because of smoke / particles gains 1 mark	1
6(b)	any <b>one</b> from: <ul style="list-style-type: none"> <li>crude oil / fossil fuel is running out / non-renewable</li> <li>demand for fuels / energy is increasing</li> <li>new legislation / protocols</li> </ul>	ignore carbon neutral / cost / less harmful / environmentally friendly allow biodiesel is renewable / sustainable ignore demand for biodiesel is increasing	1

Question 6 continues on the next page.....

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**Question 6 cont'd.....**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>6(c)(i)</b>	uses crops / land that could be used for food	allow destroys habitats <b>or</b> reduces biodiversity  ignore cost	<b>1</b>
<b>6(c)(ii)</b>	increases the cost of food / land	ignore cost of machinery / process ignore cheaper to produce biodiesel	<b>1</b>
<b>Total</b>			<b>7</b>

## CHY1F

## Question 7

question	answers	extra information	mark
7(a)(i)	plate boundary	allow plates moving / colliding allow fault line / sea floor spreading allow plate tectonics	1
7(a)(ii)	any <b>one</b> from: <ul style="list-style-type: none"> <li>do not know what happens below the Earth's crust</li> <li>no pattern</li> </ul>	allow its underground  allow random	1
7(b)(i)	any <b>one</b> from: <ul style="list-style-type: none"> <li>he could not explain how continents could move</li> <li>other ideas existed (that continents were in fixed positions <b>or</b> there had been a land bridge)</li> </ul>	allow there was no evidence / no proof / did not know about plates  allow it went against established ideas	1
7(b)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li><u>similar</u> fossils</li> <li><u>similar</u> rocks</li> <li>jigsaw fit</li> </ul>	accept in addition modern ideas such as sea floor spreading ignore plants / animals  allow rocks match up allow reference to super continent / pangea	2
7(c)	(continents move) because there are convection currents  in the mantle  caused by radioactivity	      if no other mark awarded 'continents on different plates' gains <b>1</b> mark	1  1  1
<b>Total</b>			<b>8</b>

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