Version : 07/03/2012

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1H 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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

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.

CHY1H

Question 1

question	answers	extra information	mark
1(a)(i)		use of carbon throughout = **max 1**	
	burning biodiesel releases CO_2	ignore burning trees	1
	CO_2 is absorbed / used by the crops/plants (used to produce the biodiesel)	allow CO_2 absorbed / used by trees	1
1(a)(ii)		allow use of carbon for carbon dioxide throughout	
	increases CO_2 / greenhouse effect **OR** less CO_2 is absorbed (from atmosphere)	accept causes global warming allow causes climate change ignore other correct effects	1
	because burning trees releases CO_2 **OR** because there is less photosynthesis	accept fewer trees to absorb CO_2 **or** crops / plants do not absorb as much CO_2 as trees ignore habitats / biodiversity if no other mark awarded global dimming because of smoke / particles gains **1** mark	1
1(b)	any **one** from: • crude oil / fossil fuel is running out / non-renewable • demand for fuels / energy is increasing • new legislation / protocols	ignore carbon neutral / cost / less harmful / environmentally friendly allow biodiesel is renewable / sustainable ignore demand for biodiesel is increasing	1

Question 1continues on the next page…..

Question 1 cont'd…

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

CHY1H

Question 2

question	answers	extra information	mark
2(a)(i)	plate boundary	allow plates moving / colliding allow fault line / sea floor spreading allow plate tectonics	1
2(a)(ii)	any **one** from: • do not know what happens below the Earth's crust • no pattern	 allow its underground allow random	1
2(b)(i)	any **one** from: • he could not explain how continents could move • other ideas existed (that continents were in fixed positions **or** there had been a land bridge)	 allow there was no evidence / no proof / did not know about plates allow it went against established ideas	1
2(b)(ii)	any **two** from: • similar fossils • similar rocks • jigsaw fit	accept in addition modern ideas such as sea floor spreading ignore plants / animals allow rocks match up allow reference to super continent / pangea	2
2(c)	(continents move) because there are convection currents in the mantle caused by radioactivity	 if no other mark awarded 'continents on different plates' gains **1** mark	1 1 1
Total			**8**

CHY1H

Question 3

question	answers	extra information	mark
3(a)	carbon dioxide decreased (by plants / trees)	allow plants / trees absorbed carbon dioxide	1
	oxygen increased (by plants / trees)	allow plants / trees released oxygen if neither of these marks awarded allow plants / trees photosynthesise for **1** mark	1
	because coal 'locks up' / traps / stores carbon dioxide / carbon	allow trees 'locked up' carbon dioxide / carbon	1
3(b)	carbon / C hydrogen / H sulfur / S	all 3 correct **2** marks 1 or 2 correct **1** mark allow H_2 ignore oxygen	2
3(c)(i)	2 2	balancing must be correct do **not** accept changed formulae	1
3(c)(ii)	increases atmospheric pollution carbon dioxide / CO_2 released from the (thermal) decomposition of calcium carbonate **or** description of this decomposition **or** equation decreases atmospheric pollution sulfur dioxide / SO_2 is removed by reaction with calcium oxide **or** calcium carbonate	 accept causes global warming **or** CO_2 is a greenhouse gas ignore sulfur dioxide and effects in this part accept less acid rain produced accept neutralisation **or** forms calcium sulfate	 1 1 1 1
Total			**10**

CHY1H

Question 4

question	answers	extra information	mark
4(a)	aluminium has low(est) density	ignore light / lightweight	1
	aluminium is a better conductor of electricity than iron	accept it is a good conductor **or** any valid comparison with iron / copper ignore other **correct** statements treat **incorrect** statements as a list ignore cheaper / easier to extract	1
4(b)	any **three** from: Recycling compared to the extraction from the ore: • conserves copper ores / copper / resources • causes fewer environmental problems of mining / quarrying eg. dust / loss of habitat • produces less waste disposal / landfill • produces less atmospheric pollution (by CO_2 / SO_2) • uses less energy/fuel / electricity	accept converse arguments for extraction allow produces less global warming / greenhouse gases / acid rain / harmful gases ignore waste gases ignore cost / electrolysis	3

Question 4 continues on the next page . . .

Question 4 continued . . .

question	answers	extra information	mark
4(c)(i)	heat (pentane) / high temperature catalyst / steam	stated temperature must be ≥ 200°C allow porous pot if no other mark obtained then award **1** mark for cracking alone wrong process = **0** marks	1 1
4(c)(ii)	all single bonds between C H and C C are correct	ignore changes to reactants	1
4(c)(iii)	any **three** from: <u>in PEX:</u> • cross links / extra bonds **or** chains joined together • so the chains are held in position <u>in poly(ethene)</u>: • no cross links / extra bonds **or** chains not joined together **or** weak intermolecular forces • so the chains can move / slide (over each other)	allow molecules / atoms / layers for chains throughout	3
Total			**11**

CHY1H

Question 5

question	answers	extra information	mark
5(a)	2.5	correct answer with or without working gains **2** marks if answer incorrect 2.6 / 2.625 / 2.62 / 2.63 **or** recognise 3.0 as anomalous gains **1** mark accept answer in table ignore units	2
5(b)	as the percentage of cement increases the mass needed to break the sleeper increases **or** as the percentage of sand increases the mass needed to break the sleeper decreases	allow 50% cement is the strongest **or** 30% sand is the strongest **or** the highest amount of cement is the strongest	1
5(c)(i)	any **two** from: • availability of materials • cost (of materials) • time needed (for the concrete mixture) to set/harden • compression strength (of the concrete) • testing full size (concrete railway sleepers)	 accept weight of the train accept any test on full size sleepers accept 'how well it would last / weather'	2

Question 5 continues on the next page . . .

Question 5 continued . . .

question	answers	extra information	mark
5(c)(ii)	any **four** from: <u>negative concrete:</u> • more fossil fuel / energy / heat (needed to produce cement / concrete) • cement / concrete resources / limestone not renewable whereas wood is renewable • quarrying limestone destroys landscapes / habitats whereas growing wood improves landscapes / habitats • making cement / concrete releases carbon dioxide / greenhouse gases whereas growing wood absorbs carbon dioxide / greenhouse gases / is carbon neutral <u>positive concrete:</u> • (less resources are needed because) cement / concrete sleepers last longer **or** wood rots / needs replacing	maximum of **3** marks if no comparison made ignore yes or no allow converse statements for wood allow quarrying causes noise pollution / dust / etc. allow making cement / concrete causes global warming / climate change whereas growing wood reduces global warming / climate change ignore loss of trees / deforestation (and resultant effects such as an increase in CO_2) ignore strength / ease of breaking ignore weathering / effects of acid rain	4
Total			**9**

UMS Conversion Calculator www.aqa.org.uk/umsconversion