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General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1H Unit Chemistry 1

Mark Scheme

2010 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 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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Marking Guidance for Examiners

GCSE Science Papers

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.

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Question 1

question	answers	extra information	mark
1(a)(i)	A **and** 3	accept A **and** 39	1
	anomalous result	independent mark accept not close to other two volumes **or** correct comparison using the results ignore does not fit the pattern	1
1(a)(ii)	any **one** from: • volume of water (used) • time (for water to run through) • temperature • mass / surface area of pad • same filter funnel	allow amount of water (used) accept rate / speed (at which water runs through) accept amount / size / volume / thickness of pad ignore other equipment	1
1(a)(iii)	any **one** from: • incorrect / volume / amount of water added • reading / volume / amount of water collected • some water does not go through the pad • not enough time allowed for water to drain through • pads (from one company) not identical / faulty	ignore human error unqualified allow spillage / poorly placed pad accept rate / speed at which water is added	1

Question1 Continues on the next page

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Question 1 continued

question	answers	extra information	mark
1(b)(i)	any **two** from: • it was not the best (at absorbing the water) • (needed) to absorb more (water) • to improve their image / sales	accept correct descriptions of 'not the best' / third best **or** only better than B allow not absorbing enough (water) accept (needs) to absorb more (water) than A and C for **2** marks	2
1(b)(ii)	any **one** from: • cost (more) • use (more) resources • use (more) energy	must relate to the company	1
Total			**7**

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Question 2

question	answers	extra information	mark
2(a)(i)	condensed	it = water vapour accept temperature went below 100°C / boiling point of water allow cooled to form liquid / water / rain do **not** accept evaporated	1
	formed the oceans / seas	ignore rain accept (water vapour) cooled and formed the ocean / sea for **2** marks	1
2(a)(ii)	any **two** from: • used by (green) plants / algae • changed into oxygen • dissolved in oceans / seas • (locked up) in carbonates / sedimentary rocks • (locked up) in fossil fuels / named fossil fuel	ignore oxygen / nitrogen increased ignore reference to volcanoes / respiration accept photosynthesis / plants give out oxygen accept (locked up) in shells / skeletons (of animals)	2
2(b)(i)	cannot get to / reach / drill to / see the core	accept the core is (too) far down (into the Earth) / do not know what happens under the crust / Earth's surface accept it is (too) hot / radioactive ignore lack of evidence unqualified	1

Question 2 continues on the next page

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Question 2 continued

question	answers	extra information	mark
2(b)(ii)	any **three** from: • heat / energy released • from radioactive decay / processes • (causing) convection currents • in the mantle	accept radioactivity / nuclear reactions	3
Total			**8**

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Question 3

question	answers	extra information	mark
3(a)(i)	C	must be correct symbol do **not** accept carbon any balancing must be correct	1
3(a)(ii)	$Fe + CO_2$ 2…. + 3….	correct formulae correct balancing allow $Fe_2 + 3CO_2$ for this mark	1 1
3(a)(iii)	layers / atoms in pure iron are able to slide over each other **or** layers / atoms in cast iron are unable to slide over each other (easily)	it = pure iron accept ions for atoms ignore molecules / particles	1

Question 3 continues on the next page

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Question 3 continued

question	answers	extra information	mark
3(b)	any **three** from: • less iron ore used • less other metals extracted / used to make different steels • less fuel used • less specified pollution • less / no landfill space needed • less / no mining needed **or** fewer specified effects of mining	mention of ozone = max **2** accept the idea that ores would be conserved but not unspecified conservation accept the idea that ores would be conserved but not unspecified conservation accept the idea that fuels would be conserved ignore reduces energy requirements accept global warming / greenhouse effect / CO_2 / CO / carbon emissions / acid rain / SO_2 / global dimming / do **not** accept ozone layer ignore reduces waste accept effect such as eyesore / loss of habitat eg 'less mining iron ore' = **2** marks	3
Total			**7**

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Question 4

question	answers	extra information	mark
4(a)(i)	(iodine is) decolourised	accept colourless allow oil decolourised ignore initial colour of iodine / nothing / clear	1
4(a)(ii)	(molecule / compound) has a double (carbon carbon) bond	allow C = C	1
4(a)(iii)	palm any **one** from: • contains less / low amount of unsaturated fat(s) • contains more / high amount of saturated fat(s)	 only allow this mark if correct **or** no answer in first part ignore references to iodine number / melting point	1 1
4(b)	any **three** from: • (react with*)* hydrogen • with a (nickel) catalyst • at about 60°C • increase *the* melting point	cracking / emulsification = max **2** accept by hydrogenation do **not** accept cracking / emulsify allow hot **or** range 50°C to 120°C	3
Total			**7**

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Question 5

question	answers	extra information	mark
5(a)(i)	(thermal) decomposition	allow it breaks down accept symbol equation or in words allow reaction with SO_2 (to form CO_2)	1
5(a)(ii)	calcium carbonate / calcium oxide / limestone / quicklime / it reacts with sulfur dioxide / forms calcium sulfate	accept it neutralises sulfur dioxide / neutralisation ignore references to sulfur do not accept 'calcium reacts with…'	1
5(b)	by incomplete / partial combustion (of the fuel) insufficient oxygen / *air* (to burn fuel)	 accept insufficient oxygen / *air* to burn fuel completely for **2** marks if no other marks awarded accept $C + CO_2 \rightarrow 2CO$ **or** $2C + O_2 \rightarrow 2CO$ **or** in words for **1** mark	1 1

Question 5 continues on the next page

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Question 5 continued

question	answers	extra information	mark
5(c)(i)	any **two** from: • (CO_2) from the atmosphere • (CO_2) taken in millions of years ago **or** early (atmosphere) • (CO_2) was used to form the shells / skeletons of marine organisms / fossil fuels	allow thousands / billions allow rocks formed millions of years ago accept sedimentary rocks allow used to form correct named fossil fuel ignore limestone	2
5(c)(ii)	any **one** from: • *(*increases / enhances*)* global warming • is additional carbon dioxide **or** not able to be absorbed by oceans / seas **or** used by (green) plants • acidification of sea water	allow greenhouse gas / effect do **not** accept ozone layer / acid rain / global dimming ignore consequences of global warming	1
Total			**7**

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Question 6

question	answers	extra information	mark
6(a)	it is a mixture (of hydrocarbons) **or** contains hydrocarbons with different boiling points	accept 'to separate (crude) oil (into fractions) **or** obtain the naphtha (fraction) accept to get useful products ignore removal of impurities	1
6(b)(i)	heat / vaporise	mention of hydrogen = max **1** accept thermal (decomposition) for heat allow boil do not allow temperatures below 100°C ignore steam	1
	catalyst	allow alumina / porous pot ignore other catalysts	1
6(b)(ii)	4 × C – H **and** C = C	ignore brackets with or without an 'n' before them do not allow poly(ethene)	1

Question 6 continues on the next page

question	answers	extra information	mark
6(c)		ignore ideas about carbon dioxide formation / photosynthesis or cost / economics / environmentally friendly	
	any **four** from: **must** be at least **one** advantage and **one** disadvantage for all four marks	candidates are only awarded **1** mark if they use equivalent pairs of bulleted points	4
	<u>crops</u> advantages eg:	<u>crude oil</u> disadvantages eg:	
	• renewable (resource) / sustainable	• *non*-renewable (resource) / finite / running out	
	• low / less energy / fuel needed for process **or** lower temperature [ignore heat or quoted temperatures]	• high / more energy needed for process **or** higher temperature	
	• can use waste plant / crop material		
	• carbon neutra*l*	• not carbon neutral **or** releases locked up carbon	
	• low safety risk (processes)	• high safety risk (process)	
	• low technology	• high technology	
		• risk of major oil spillage	
		• can be used to make other products	
	disadvantages eg:	advantages eg:	
	• batch process / process is slow	• continuous process / process is fast	
	• many steps in the process	• few steps in the process	
	• ethanol is impure / may contain water	• ethanol is pure	
	• food shortages	• ‘conserves’ food	
	• need very large areas of (arable) land to grow crops **or** can only grow in certain areas / climates	• can accept reverse arguments	
	• destruction of woodland / habitat		
	• slow growth of crops		
	• labour intensive		
	a conclusion with a reasoned argument based on	there must be at least one advantage and one disadvantage, however, a	

	valid advantages **and** disadvantages	matched pair, although only awarded one mark would allow the conclusion mark to be awarded	1
Total			**9**