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General Certificate of Secondary Education

Science B 4462 / Chemistry 4411

CHY1H Unit Chemistry 1

Mark Scheme

2010 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 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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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 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)	(yes as it) has the lowest / least (%)	ignore no accept it is only 6.6(%) accept any correct comparisons	1
1(a)(ii)	(no as it) any **one** from: • is second lowest • is 'medium' • is (only) third highest • depends on which oil it is compared with	ignore yes ignore it is only 29.3% accept neither high or low accept not the highest accept any correct comparison accept it has more mono – unsaturated fat	1
1(b)	(test) add bromine / iodine (solution) (result) turns colourless / decolourises	ignore bromide / iodide ignore colours ignore clear ignore changes colour	1 1
1(c)(i)	increase(s) / gets higher	ignore boiling point	1
1(c)(ii)	would increase the saturated (fat) **or** reduce the unsaturated (fat) saturated (fat) is not / less healthy **or** unsaturated (fat) is healthy	idea of increase is required idea of reduction is required accept hydrogenated (fat) is not / less healthy accept bad for you **or** causes heart disease accept good for you eg it would not make it healthier = **0** marks it would not make it healthier because it is saturated(fat) = **2** marks	1 1
Total			**7**

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Question 2

question	answers	extra information	mark
2(a)(i)	any **one** from: • contain metals / filaments / wires • contain other / toxic chemicals / materials • different type of glass	ignore contamination without explanation accept named metal(s) accept named chemical(s) / material(s) accept glass would not melt ignore thicker / thinner glass	1
2(a)(ii)	any **one** from: • (glass bottles are) recycled • need to be more expensive glass **or** strong / thicker / different glass (to be reused) • damaged / weaker (with reuse) • need to be cleaned / transported • different sizes / shapes / colours • no refunds paid	 accept made to be used only once accept glass bottles are made of readily available materials **or** thin / cheap glass accept need to be sorted	1
2(a)(iii)	any **two** from: • low / less energy / heat or lower temperature needed • low / less fuel burned • no (carbon dioxide) from carbonate(s)	allow converse arguments ignore no energy without explanation ignore no fuel without explanation accept less fuel for extraction / transportation of raw materials accept name(s) of this carbonate(s)	2
2(b)(i)	46		1

Question 2 continues on the next page…

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Question 2 continued

question	answers	extra information	mark
2(b)(ii)	any **one** from: • (more) imported (as wine bottles) • not much green glass made in the UK • not a high demand (for green glass)	accept come from / made in other countries **or** made elsewhere	1
2(b)(iii)	any **two** from: • more (clear) glass is produced (64%) than recycled (40%) • (clear) glass going to landfill • (more) raw materials needed / extracted / quarried • (more) heat / energy / fuel would be needed • (more) carbon dioxide produced	accept not enough (clear) glass is recycled allow 'thrown away' ignore they will run out accept high carbon footprint / carbon emissions **or** global warming	2
Total			**8**

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Question 3

question	answers	extra information	mark
3(a)	(thought to cause) global warming / green house (effect) / climate change	ignore other consequences of global warming do **not** accept acid rain / ozone layer / global dimming	1
3(b)	any **three** from: • replant trees / renewable / sustainable • carbon (dioxide) used by trees / photosynthesis • it is a (continuous / carbon) cycle **or** carbon (dioxide) goes back into the air • no new carbon (dioxide) is produced **or** no locked up carbon (dioxide) is released **or** the carbon (dioxide) was absorbed millions of years ago	 ignore reusable accept trees absorb carbon (dioxide) as they grow ignore respiration accept burning wood is carbon neutral for the **second** and **third** bullet points: accept trees use carbon dioxide which is released when (trees / wood are / is) burnt for **2** marks	3
Total			**4**

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Question 4

question	answers	extra information	mark
4(a)	no / insufficient evidence / proof / explanation	accept there were other theories such as a land bridge / solid crust	1
4(b)	(continental / tectonic) plates move any **one** from: • (caused by) convection currents (in the mantle) • (driven by) heat (energy) released by radioactive processes / decay • sudden (movement) / vibrations		1 1
4(c)	any **one** from: • do not know / see / able to detect / measure what is happening <u>below the Earth's crust</u> • build up of pressure between plates is randomly released	 ignore cannot measure movement of plates / unpredictable accept (movement) is random / no pattern	1
Total			**4**

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Question 5

question	answers	extra information	mark
5(a)(i)	sulfur dioxide (forms) acid rain	allow sulfur oxide accept acidic lakes / seas ignore consequences do **not** accept global warming / global dimming / ozone layer	1 1
5(a)(ii)	electrolysis	allow phonetic spelling ignore electroplating	1
5(b)(i)	alloyed / mixed with other metals / elements / atoms / zinc / tin	allow combined / added ignore make it impure do **not** allow reacted / bonded / joined	1
5(b)(ii)	(in the pure copper) copper / metal / atoms / layers able to slide over each other zinc / tin / other (atoms) change the structure / disrupt pattern / layers **or** zinc / tin (atoms) are a different size	accept zinc / tin / other (atoms) prevent (copper) atoms / layers sliding over each other ignore different shapes	1 1
Total			**6**

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Question 6

question	answers	extra information	mark
6(a)	vaporise / evaporate different condensing points / temperatures	allow boil for vaporise accept condense at different levels ignore different size molecules or different densities mention of cracking = max **1** allow boils at different temperatures and condenses for **2** marks if no other marks awarded allow fractional distillation for **1** mark	1 1
6(b)(i)	3 (C_2H_4)	accept +C_4H_8	1
6(b)(ii)	(decane / naphtha / hydrocarbon) vaporise / evaporate (passed over) a catalyst / alumina / porous pot	allow crude oil allow boil for vaporise ignore other names of catalysts	1 1
6(c)	any **two** from: • alkanes / butane (molecules) do not have a (carbon carbon) double bond / are saturated / have (carbon carbon) single bonds • alkenes / ethene (molecules) have (carbon carbon) double bonds **or** are unsaturated • alkenes / ethene molecules are able to bond to other molecules	'they' must be clarified	2
6(d)	single bonds between carbon atoms the $–CH_3$ group appears on each pair of carbons on the 'chain'	— C – C — NB any double bonds = **0** marks	1 1
Total			**9**

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Question 7

question	answers	extra information	mark
7(a)	gas / carbon dioxide / CO_2 (produced / released)	ignore how gas is formed	1
7(b)	any **two** from: • calcium oxide / CaO / quicklime (is the solid) • (calcium oxide) reacts with water **or** carbon dioxide • argon would not react	 accept reacts to form calcium hydroxide / calcium carbonate	2

Question 7 continues on the next page

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Question 7 continued

question	answers	extra information	mark
7(c)	for full marks: candidates should consider and explain **four** of the following points:	for full marks candidates must have at least **one** advantage and **one** disadvantage allow only one advantage / disadvantage for each point **but** each point could be correctly explained as an advantage **and** a disadvantage for **2** marks ignore issues common to all sites eg scarring the landscape / area of natural beauty ignore comments about sites other than the one chosen unless a comparison is made	max 4
	1 Wood / habitats – • screening / use of wood • damage to habitat		
	2 Town (proximity) - • noise / visual / dust pollution / damage / subsidence	ignore pollution unless explained	
	3 Labour force- • proximity to site (travelling time / use of fuel / carbon footprint)		
	4 River - • pollution due to nearness		
	5 Transport (of materials) – • (nearness to road / railway*)*		
	6 Quality of limestone – • (best D – C – A – B worst) • amount of waste		
	7 Wind direction – • carries dust, noise, fumes etc towards town • (only B & D are directly downwind of town)		
Total			**7**