



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F 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.

CHY1F
Question 1

question	answers	extra information	mark
1(a)(i)	copper / Cu		1
1(a)(ii)	50(p)		1
1(a)(iii)	25		1
1(a)(iv)	tin		1
1(b)(i)	any one from: <ul style="list-style-type: none"> • high cost of <u>copper</u> • less <u>copper</u> available or (copper ores exhausted / only low-grade ores available) • high demand for copper • high percentage (%) of copper in the coin • inflation (of cost) 	allow <u>metal</u> is expensive allow <u>copper</u> is non-renewable	1
1(b)(ii)	any one from: <ul style="list-style-type: none"> • stronger / harder • cost of copper or copper is more expensive to extract or steel is cheap • less copper available or (copper ores exhausted / only low-grade ores available) • high demand for copper • less copper is needed 	ignore rust allow cheaper (to make)	1
Total			6

CHY1F**Question 2**

question	answers	extra information	mark
2(a)(i)	any one from: <ul style="list-style-type: none"> ice-cream (has additives) milk (has additives) strawberries (could contain additives) additives, such as a sweetener or colour may have been added 	accept ingredients (may contain additives)	1
2(a)(ii)	any one from: <ul style="list-style-type: none"> cheaper keeps longer additives used for the strawberry flavour saves time 	accept strawberries are expensive accept strawberries do not keep accept strawberries can cause an allergic reaction	1
2(b)(i)	4 / four		1
2(b)(ii)	dot / colour / E129 / allura red match	ignore chromatography (test)	1
2(b)(iii)	any one from: <ul style="list-style-type: none"> none of the colours / dots in the milkshake may be caused by E129 / allura red dot is not the same size only did one test 	accept the matching dot may be caused by another / similar colour accept this could be an <u>anomalous</u> result	1
Total			5

CHY1F

Question 3

question	answers	extra information	mark																		
3(a)(i)	crust		1																		
3(a)(ii)	radioactive		1																		
3(b)	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Substance</td> <td style="width: 30%;">Environmental effect</td> <td></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Ash particles</td> <td style="border: 1px solid black; padding: 5px;">Acid rain</td> <td style="border: none;">/</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Carbon dioxide</td> <td style="border: 1px solid black; padding: 5px;">Global dimming</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Sulfur dioxide</td> <td style="border: 1px solid black; padding: 5px;">Global warming</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Water vapour</td> <td style="border: 1px solid black; padding: 5px;">Non-polluting liquid</td> <td style="border: none;"></td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">Radioactive processes</td> <td style="border: none;"></td> </tr> </table>	Substance	Environmental effect		Ash particles	Acid rain	/	Carbon dioxide	Global dimming		Sulfur dioxide	Global warming		Water vapour	Non-polluting liquid			Radioactive processes		all three correct = 3 marks two correct = 2 marks one correct = 1 mark extra line from a statement cancels the mark	3
Substance	Environmental effect																				
Ash particles	Acid rain	/																			
Carbon dioxide	Global dimming																				
Sulfur dioxide	Global warming																				
Water vapour	Non-polluting liquid																				
	Radioactive processes																				
3(c)	any one from: <ul style="list-style-type: none"> • (tectonic) plates move • faults / plate boundaries • weaknesses in the (Earth's) crust 	idea of movement is required	1																		
Total			6																		

CHY1F**Question 4**

question	answers	extra information	mark
4(a)	elements		1
4(b)(i)	nucleus		1
4(b)(ii)	six		1
4(c)(i)	CH ₄		1
4(c)(ii)	bond		1
4(d)(i)	oxygen		1
4(d)(ii)	any one from: <ul style="list-style-type: none"> • (water) does not pollute • (only) water is produced • <u>no</u> carbon dioxide / monoxide (is produced) 	accept no harmful gas(es) allow less pollution accept <u>no</u> greenhouse gas(es) / effect or <u>no</u> global warming	1
Total			7

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Question 5

question	answers	extra information	mark
5(a)(i)	any one from: <ul style="list-style-type: none"> • bond / join (together) • double bond opens 	ignore polymerisation / heat	1
5(a)(ii)	any one from: <ul style="list-style-type: none"> • heat / energy • cost of fuels / the crude oil • construction of the factory / plant • wages / salaries 	ignore many processes / distillation / cracking / polymerisation	1
5(a)(iii)	any two from: <ul style="list-style-type: none"> • non-biodegradable • landfill sites are filling up / limited • waste of a resource / could be recycled / reused 	ignore gases released / burning / habitats accept remains a long time accept land / space used up accept crude oil is running out	2
5(b)	any two from: <ul style="list-style-type: none"> • renewable / sustainable • less fuel <u>burned</u> • biodegradable • <u>natural</u> resource • plants absorb carbon dioxide 	ignore recycling ignore crude oil is running out accept less energy / heat needed	2
Total			6

CHY1F
Question 6

question	answers	extra information	mark
6(a)(i)	(yes as it) has the lowest / least (%)	ignore no accept it is <u>only</u> 6.6(%) accept any correct comparisons	1
6(a)(ii)	(no as it) any one from: <ul style="list-style-type: none"> • 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
6(b)	(test) add bromine / iodine (solution)	ignore bromide / iodide ignore colours	1
	(result) turns colourless / decolourises	ignore clear ignore changes colour	1
6(c)(i)	increase(s) / gets higher	ignore boiling point	1
6(c)(ii)	would increase the saturated (fat) or reduce the unsaturated (fat)	idea of increase is required idea of reduction is required	1
	saturated (fat) is not / less healthy or unsaturated (fat) is healthy	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
Total			7

CHY1F

Question 7

question	answers	extra information	mark
7(a)(i)	any one from: <ul style="list-style-type: none"> 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
7(a)(ii)	any one from: <ul style="list-style-type: none"> (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
7(a)(iii)	any two from: <ul style="list-style-type: none"> low / <u>less energy</u> / heat or lower temperature needed low / <u>less fuel</u> burned no (carbon dioxide) from carbonate(s) 	allow converse arguments ignore <u>no energy</u> without explanation ignore <u>no fuel</u> without explanation accept <u>less fuel</u> for extraction / transportation of raw materials accept name(s) of this carbonate(s)	2
7(b)(i)	46		1

Question 7 continues on the next page...

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Question 7 continued

question	answers	extra information	mark
7(b)(ii)	any one from: <ul style="list-style-type: none"> • (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
7(b)(iii)	any two from: <ul style="list-style-type: none"> • 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