



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2011 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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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)	layer 1 – crust	extra line from a layer cancels the mark	1
	layer 2 – mantle		1
	layer 3 – core		1
1(b)(i)	0.97	extra ring drawn cancels the mark	1
1(b)(ii)	carbon dioxide / CO ₂		1
Total			5

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Question 2

question	answers	extra information	mark
2(a)	sulfur dioxide / SO ₂	allow sulfur oxide	1
2(b)	global dimming		1
2(c)	oxygen / O ₂		1
2(d)	(oil is a) limited resource / finite / non-renewable	accept running out of oil or wood is sustainable accept (burning oil) increases amount of carbon dioxide in the atmosphere / global warming or releases locked up carbon / global dimming / acid rain accept the oil (may become) too expensive	1
2(e)	carbon dioxide produced (from burning wood) carbon dioxide used by plants / trees or for photosynthesis	ignore global warming if no other mark awarded allow carbon emissions used by plants / trees or for photosynthesis for 1 mark	1 1
Total			6

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Question 3

question	answers	extra information	mark
3(a)	to improve the appearance of the drink		1
	because they are permitted colours		1
3(b)(i)	chromatography		1
3(b)(ii)	three / 3		1
3(b)(iii)	because one colour / spot / E102 <u>matched</u>		1
	because the other / two colours / spots / E104 and E110 did <u>not match</u>	if no other mark awarded allow because the drink did not contain E104 and E110 or because the drink contained E102 for 1 mark accept <u>only E102 matched</u> for 2 marks	1
Total			6

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Question 4

question	answers	extra information	mark
4(a)	(carbon =) 1		1
	(oxygen =) 3		1
4(b)(i)	heated		1
4(b)(ii)	carbon dioxide		1
4(c)(i)	combustion		1
4(c)(ii)	carbon is more reactive than zinc		1
4(c)(iii)	zinc boils (in the furnace / below 1300°C)	ignore melting point / changes of state	1
	lead does not boil / (only) melts in the furnace / boils above 1300°C	if no other mark awarded allow zinc has a lower boiling point or lead has a higher boiling point or they / zinc and lead have different boiling points for 1 mark	1
Total			8

CHY1F**Question 5**

question	answers	extra information	mark
5(a)(i)	distillation		1
5(a)(ii)	condense (at different temperatures)	accept they / fractions / hydrocarbons have different boiling points ignore melting point / size of molecule	1
5(b)	contains hydrocarbons has a high boiling point		1 1
5(c)	C_5H_{12}		1
Total			5

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Question 6

question	answers	extra information	mark
6(a)(i)	A	allow –11	1
6(a)(ii)	as the percentage of unsaturated fat decreases the melting point increases or vice versa	ignore boiling point / temperature ignore pattern linked to the percentage of saturated fat ignore numerical values	1
6(a)(iii)	D	allow 10	1
6(b)	any one from: <ul style="list-style-type: none"> • increase the melting point • make it 'spreadable' • make it solid (at room temperature) • increase the % of saturated fat or decrease the % of unsaturated fat 	do not accept to make it less healthy or more healthy ignore boiling point allow make it hard(er) ignore density / mass / viscous / thicker allow make it saturated ignore references to double / single bonds	1
6(c)	stop people eating unhealthy fat		1
Total			5

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Question 7

question	answers	extra information	mark
7(a)(i)	heat / high temperature / hot / vaporise catalyst or silica / alumina / porous pot or steam	if (fractional) distillation / hydrogenation mentioned as the method = max 1 allow thermal decomposition ignore evaporation do not accept 'burns' do not accept temperature < 100 ignore other named catalyst allow heat (the vapour) to a <u>very</u> high temperature / >800°C for 2 marks	1 1
7(a)(ii)	C ₂ H ₃ Cl	ignore attempts to balance equation	1
7(a)(iii)	single bonds between C – H, C – Cl and C – C	do not accept symbols outside the bracket	1
7(b)(i)	so that the amount of plasticiser / (sample of) PVC is the independent / only variable that affects the bending / flexibility of the samples	allow because different sizes would give different results accept because size is a control variable ignore references to reliability / precision etc	1
7(b)(ii)	to improve the <u>reliability</u> (of the investigation)	accept to calculate a mean accept to check for anomalous results or to check the range of results ignore accuracy / precision etc	1

Question 7 continues on the next page

Question 7 continued

question	answers	extra information	mark
7(b)(iii)	23	correct answer with or without working = 2 marks if answer is incorrect allow $\frac{22 + 23 + 24}{3}$ or 21 for 1 mark	2
7(b)(iv)	(PVC) sample had been stretched / used / tested in first three tests	accept higher temperature allow worn or become weaker ignore (human) error ignore more flexible / softer ignore intermolecular forces	1
7(c)	does not bend (easily / much) or it is <u>not</u> flexible or it is rigid	ignore non-biodegradable / low maintenance ignore sturdy / stronger / harder	1
Total			10

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