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General Certificate of Secondary Education
January 2013

Science A / Chemistry CH1FP

(Specification 4405 / 4402)

Unit 1: Chemistry 1

Final

Mark Scheme

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 events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process 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 standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised 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.

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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 bullet points 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	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, 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, 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 or by each stage of a longer calculation.

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.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.
Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 7(c) students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

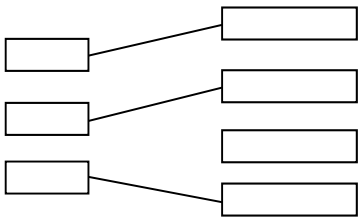
Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

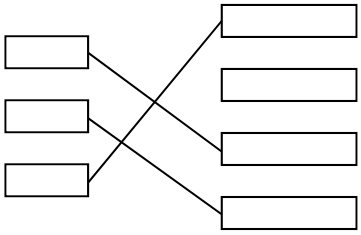
Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

CH1FP

question	answers	extra information	mark
1(a)(i)	nucleus		1
1(a)(ii)	an energy level (shell)		1
1(b)			1 1 1
1(c)	2/two(%)		1
1(d)(i)	10/ten		1
1(d)(ii)	(group) 0	accept noble gases ignore (group) 8	1
Total			**8**

CH1FP

question	answers	extra information	mark
2(a)			1 1 1
2(b)(i)	is on a tectonic plate boundary		1
2(b)(ii)	scientists cannot accurately predict when volcanic eruptions will occur		1
2(c)	global dimming acid rain	must be in this order	1 1
Total			**7**

CH1FP

question	answers	extra information	mark
3(a)(i)	emulsion		1
3(a)(ii)	any **one** from: • provides better texture • improves coating ability • improves appearance	ignore forms an emulsion allow improves the taste allow easier to spread allow prevents ingredients from separating **or** stays mixed	1
3(b)(i)	higher / greater	allow high accept 200(°C) more allow (only) 100°C	1
3(b)(ii)	any **two** from: in olive oil the food • has a higher energy content • has a harder/crisper texture • has a different flavour / taste • absorbs olive oil	allow converse points for water allow not as healthy **or** more fat if no other mark awarded allow cooks quicker for **1** mark	2
Total			**5**

CH1FP

question	answers	extra information	mark
4(a)(i)	Positive impact any **one** from: • provides employment **or** • improves local economy • improved transport - new roads are built, new rail links • after use the quarry could provide recreation facilities		1
	Negative impact any **one** from: • destruction of animal habitats • fewer plants and trees to absorb carbon dioxide • visual pollution **or** noise pollution **or** atmospheric / air pollution • more traffic • uses non-renewable resources	allow dust pollution allow pollutants from burning diesel	1
4(a)(ii)	economical		1
4(b)	carbon / coke burns (in oxygen / air)	accept carbon / coke reacts with oxygen / air	1
4(c)(i)	iron oxide (reactant) carbon dioxide (product)	must be words	1 1
4(c)(ii)	reduction		1

CH1FP

question	answers	extra information	mark
4(d)(i)	oxygen reacts with carbon **or** oxygen and carbon produce carbon dioxide / carbon monoxide carbon dioxide / carbon monoxide is a gas **or** the carbon is removed as a gas		1 1
4(d)(ii)	much harder		1
4(e)	Advantage: less carbon dioxide is produced Disadvantage: there are different types of steel which must be sorted		1 1
Total			**12**

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question	answers	extra information	mark
5(a)	Methane has the lowest melting point and icosane has the highest boiling point Decane and icosane are liquid at 100°C		1 1
5(b)	water / H_2O carbon dioxide / CO_2	either order allow hydrogen oxide	1 1
5(c)(i)	fermentation		1
5(c)(ii)	any **two** from: • sugar cane/plants absorb carbon dioxide • growing sugar cane/plants reduces global warming • renewable resource/sustainable	ignore oxygen released allow ethanol from plants is carbon neutral accept conserves fossil fuels / petrol	2
5(c)(iii)	any **two** from: • destruction of habitats/forests (to grow sugar cane/crops) • fermentation releases carbon dioxide • production plants cause visual pollution • pollution from the transportation of sugar cane / Ethanol • growing sugar cane / plants uses a lot of land		2
Total			**9**

CH1FP

question	answers	extra information	mark
6(a)	time from when the heating is started until the limewater turns cloudy / milky		1 1
6(b)(i)	the temperature was not high enough the bubbles of gas were air	accept the copper carbonate had not started to decompose / react accept it takes time to heat up the copper carbonate accept no carbon dioxide produced	1 1
6(b)(ii)	the copper carbonate was decomposing / reacting so carbon dioxide was produced	accept the temperature was high enough to cause decomposition / a reaction allow correct word / symbol equation	1 1
6(b)(iii)	copper oxide was produced because the copper carbonate had completely decomposed / reacted	allow correct word / symbol equation ignore all of the carbon dioxide had been given off	1 1
Total			**8**

CH1FP

question	answers	extra information	mark
7(a)	heat to vaporise (the crude oil)	do **not** accept cracking / burning	1
	vapours condense		1
	at different temperatures	allow they have different boiling points	1
7(b)	(alkanes) are hydrocarbons **or** are compounds of hydrogen and carbon only		1
	alkanes are saturated **or** have only (carbon-carbon) single bonds	accept have no (carbon-carbon) double bonds accept general formula is C_nH_{2n+2} for **2** marks	1

CH1FP

question	answers	extra information	mark

7(c)

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. — 6

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a basic description of at least one advantage or one disadvantage of extracting petroleum products from oil sands.	There is a clear description of an advantage and a disadvantage of extracting petroleum products from oil sands.	There is a detailed description of both advantages and disadvantages of extracting petroleum products from oil sands.

examples of the chemistry/environmental/economic/social points made in the response

Advantages:

- the oil sands are needed because crude oil is running out
- this crude oil is needed because demand is increasing
- the oil sands contain a large amount of crude oil
- the oil sands could improve Canada's economy
- the oil sands provide employment for a lot of people
- the trees / forest are used for wood products / fuel

Disadvantages:

- destruction of environment / habitats
- fewer trees / forests to absorb carbon dioxide
- specified pollution, for example, visual, noise, atmospheric (including dust), water (including river or drinking) with cause, e.g. gases/particulates from burning diesel
- large amounts of methane(natural gas) are used to provide energy
- energy / fuel needed for cracking and fractional distillation
- burning fuel releases carbon dioxide
- crude oil / natural gas contains locked up carbon
- crude oil is non-renewable

Total		11

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