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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1H Unit Chemistry 1

Mark Scheme

2009 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.

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
1(a)(i)	polyethene / poly(ethene)	accept polythene / polyethylene	1
1(a)(ii)	needs heat / energy / high temperature / fuel (for cracking) produces carbon dioxide / CO_2	ignore other processes ignore use of CO_2 **or** 'produces carbon'	1 1
1(b)	any **three** from: • use water from local sources **or** water from close to home • recycle bottles in the UK / close to home • (reduction in distance travelled) would reduce CO_2 emitted by transport • use tap water • use glass bottles / waxed cartons / metal bottles • do not put in landfill **or** recycle <u>more</u> • reuse / refill plastic bottles • <u>tax</u> imported water / plastic bottles (to offset carbon cost) • make more / all plastic bottles in UK	answers must be about the reduction of carbon cost accept do not recycle in other countries / Asia accept use of transport with low / no carbon dioxide emissions do **not** accept 'do not use plastic bottles' without an alternative material	3
Total			**6**

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

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question	answers	extra information	mark
2(a)(i)	the greater the number (of carbon atoms), the higher its boiling point	do **not** accept hydrocarbons for carbon atoms allow converse allow melting point	1
2(a)(ii)	accept answers in the range 344 to 350		1
2(a)(iii)	216		1
2(b)(i)	**EITHER** shortage of petrol **or** demand for petrol is higher than supply diesel is in excess **or** supply of diesel is higher than demand **OR** petrol low supply **and** diesel high supply (1) petrol high demand **and** diesel low demand (1)	petrol / diesel not specified = max **1** mark	1 1
2(b)(ii)	any **one** from: • <u>use diesel</u> to make petrol • make diesel cheap(er) (than petrol) **or** make petrol more expensive • mix ethanol with petrol	accept crack diesel **or** description of cracking accept lobby the government to reduce the tax on diesel / increase tax on petrol ignore biodiesel	1
Total			**6**

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
3(a)	(Chromium =) 20 (Nickel =) 8	in correct order accept Chromium = 8 **and** Nickel = 20 for **1** mark	1 1
3(b)(i)	(because iron is made up of only) one type of atom		1
3(b)(ii)	not strong	ignore soft / corrosive / flexible accept it rusts / corrodes **or** that it could wear away accept could change shape / bend accept layers / atoms could slide (over each other)	1
3(b)(iii)	has different sized atoms / particles **or** structure is different/distorted / disrupted so it is difficult for layers / atoms / particles to slip / slide (over each other)	 accept not in layers **or** not regular accept layers cannot slip / slide	1 1
Total			**6**

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
4(a)	(Kent reported because) damage was caused **or** it was above 3 (on the Richter scale)	accept description of damage	1
	(others not reported because) no vibrations / not felt / not noticed	allow below 3 (on Richter scale) ignore no damage	1
4(b)	movement of (tectonic) plates	allow collision of plates **or** plates rubbing together **or** plates pushing against each other	1
	any **two** from: • vibration / (shock)waves (in the earth) **or** p and s waves • caused by convection currents (in the mantle) • heat / energy released from radioactive processes	accept sudden jolts / slips	2
4(c)	any **two** from: scientists do not know: • what happens under the crust / mantle / under the surface • where forces / pressures are building up • how to measure these forces / pressures • when these forces / pressures reach their limit	accept anything under the crust accept there is no pattern ignore random / speed of movement	2
Total			**7**

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
5(a)(i)	oxygen / air reacts with carbon / methane (to form carbon dioxide) nitrogen is (unreacted) from the air	accept from the decomposition / reaction of calcium carbonate ignore CO_2 from the air	1 1
5(a)(ii)	CaO CO_2	any order ignore words any incorrect balancing max **1** mark	1 1
5(b)	any **one** from: • more energy / efficient • from a sustainable / renewable resource • produces less / no carbon dioxide / greenhouse gases / global warming • more profit **or** money for local economy • more readily available	it = different fuel allow converse for present fuel ignore no pollution / environmental damage accept fuel is cheap(er)	1
5(c)(i)	any **two** from: • not near where people / residents live • not positioned where concentration of particles was likely to be highest • not positioned downwind	 accept not between cement works and where people live ignore sensors are unsightly	2

Question 5 continues on the next page...

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STATUS: Final

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Question 5 continued...

question	answers	extra information	mark
5(c)(ii)	the average / concentration was 1.8(ppm) **or** the average / concentration was below 2(ppm)	accept 1.8(ppm) is less than 2.0(ppm)	1
5(c)(iii)	any **three** from: • children / people suffering asthma attacks • result was an average • readings (at some (2/3) sensors) could have been higher than 2ppm • sensors did not detect particles below 0.5mm • small particles / particles below 0.5mm / 0.4mm / 0.3mm / 0.2mm could (still) cause cancer / asthma	ignore global dimming **or** cars becoming dirty **or** position of sensors	3
Total			**11**

COMPONENT NUMBER: CHY1H

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
6(a)(i)	Sudan 1 is not a permitted additive	accept it is illegal **or** it is not allowed (in Europe) ignore unsafe	1
6(a)(ii)	the Sudan 1 should have been included to compare against the colourings (in the red chilli powder)		1 1
6(b)(i)	23 to 59	accept 36	1
6(b)(ii)	decolourise **or** (orange to) colourless (because bromine reacts with the) (carbon) double bond	ignore discolours / fades do **not** allow oil decolourises ignore alkenes **or** reference to unsaturation	1 1
6(b)(iii)	any **one** from: • an anomalous result (11.2) / Test 2 • 11.2 / Test 2 is ignored when averaging	accept $\frac{23.2 + 24.0}{2}$ (= 23.6) accept average of tests 1 and 3	1
6(b)(iv)	unsaturation 67% (this means there is) 33% saturated fat	average was less than it should be / only 26.8 cm^3 it should have been 28.0cm^3 to give a percentage of 70%	1 1
Total			**9**