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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1H Unit Chemistry 1

Mark Scheme

2007 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 / ; e.g. 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.

3.8 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

Question 1

	answers	extra information	mark
(a)	radioactivity (keeps the core hot)	accept half-life of radioactive elements has proved the Earth is older than 400 million years accept the Earth is not cooling do **not** accept fossil / rock evidence	1
(b)	any **two** from: • the shapes of the two continents fit together (like a jigsaw) OWTTE • the <u>same</u> type of rocks have been found • the <u>same</u> fossils have been found • rising magma rising through a gap under the Atlantic	 do **not** accept the continents / they are the same shape accept 'rocks match' accept 'fossils match'	2
(c)	any **two** from: • earthquakes • volcanoes • idea of distance between America and Europe / Africa is increasing e.g. continental drift • oceanic ridges • formation of (new) mountain ranges • formation of (new) islands • magnetic stripes • tsunamis	 accept seismic waves accept ocean floor spreading accept fold mountains or mountains increasing in height	2
total			5

Question 2

	answers	extra information	mark
(a)	oxygen **and** nitrogen		1
	20 – 21 % **and** 78 – 80 %	accept any two correct responses in the correct space for **one** mark	1
(b)(i)	acid rain	accept toxic gas or consequence of acid rain	1
(ii)	idea of the removal or use of sulfur dioxide gas (from the waste gases)	do **not** accept remove sulfur from coal	1
(iii)	oxygen	accept O_2	1
	water	accept H_2O accept hydrogen oxide / steam	1
(c)	any **two** from: • it's a 'greenhouse gas' or increase greenhouse effect • causes global warming or increase in the Earth's temperature • sea-levels rise or flooding • climate change • (polar) ice-caps melt • extension of deserts	accept action of a 'greenhouse gas' mention of ozone / acid rain / global dimming = max **1** mark	2
(d)	idea trap / store / lock the carbon dioxide		1
	in the oil reservoir **or** under the sea <u>bed</u>	do **not** accept 'into the oil' / 'under the sea'	1
total			10

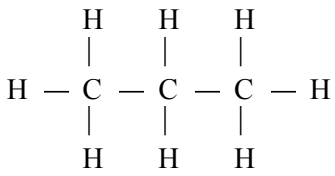
Question 3

	answers	extra information	mark
(a)(i)	contain enough metal to make it economical / worth while to extract		1
(ii)	reduction	accept displacement accept redox	1
(iii)	Fe + CO_2	do **not** accept Fe_2 / Fe_4	1
	correct balancing	accept multiples and halves	1
	2Fe_2O_3 + **3**C → **4**Fe + **3**CO_2	allow Fe_2 / Fe_4 as ecf	
(b)	**Pure Iron** (in pure metal all the atoms are the same size and) able to slip / slide over each other – (property soft)	OWTTE ignore references to molecules / particles. if they say 'move' both times, allow **one** mark but 'crack' or 'split' is wrong.	1
	Cast iron (in cast iron) different sized atoms / larger atoms **or** structure is distorted / disrupted	OWTTE	1
	so it is difficult for layers of atoms to slip / slide over each other	OWTTE	1
(c)	any **three** from: • conserves / saves resources / metal ores • saves energy resources (used for extraction / processing) • decreases waste materials • decreases a named pollution	 accept cheaper / saves money do **not** accept acid rain	3
total			10

Question 4

	answers	extra information	mark
(a)(i)	(poly)unsaturated	accept monounsaturated	1
(ii)	(turns) colourless **or** colour disappears / decolourises	do **not** accept clear	1
	stays the same colour / orange / no change	allow yellow-orange / orange-brown / red-orange	1
(iii)	(react) with hydrogen / H_2 / hydrogenation		1
	any **one** from: • heated / 60°C • catalyst / nickel		1
(b)(i)	chromatography		1
(ii)	**K**		1
(iii)	**K and L**		1
(iv)	spots / dyes / colours are in different places **or** have travelled at different rates	i.e. the place / position of the dots	1
	colours made up of different combinations / mixtures of dyes / spots	i.e. the number / combination of spots	1
total			10

Question 5

	answers	extra information	mark
(a)(i)	heat / evaporate the crude oil / change to gas or vapour	do **not** accept heat with catalyst	1
	cool / condense (hydrocarbons)	allow small molecules at top and / or large molecules at bottom	1
	at different temperatures / boiling points	if the answer describes cracking – no marks	1
(ii)	C_4H_{10}		1
(b)			1
(c)(i)	C_5 to C_8 fraction are fuels **or** easier to burn **or** petrol (fraction)	accept C_{21} to C_{24} fraction not useful as fuels do **not** accept produce more energy	1
(ii)	C_2H_4	do **not** accept C_4H_8	1

Continued on next page

	answers	extra information	mark
(iii)	any **three** from: • use different / lighter crude oils • develop markets for low demand fractions • develop new techniques / equipment to use low demand fractions as fuels • cracking • convert low demand fractions to high demand fractions **or** bigger molecules to smaller molecules • develop alternative / bio fuels	do **not** accept price	3
total			10