



## **General Certificate of Secondary Education**

# **Additional Science 4463 / Chemistry 4421**

**CHY2F      Unit 2 Chemistry**

## **Mark Scheme**

*2008 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.

Further copies of this Mark Scheme are available to download from the AQA Website: [www.aqa.org.uk](http://www.aqa.org.uk)

Copyright © 2008 AQA and its licensors. All rights reserved.

#### COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

---

## 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.

### 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.

---

**CHY2F****Question 1**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)	CH <sub>4</sub>	4 should be below halfway up H / tail of 4 below the dotted line	1
(b)	molecule		1
(c)	covalent		1
total			3

**CHY2F****Question 2**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)		<p>all three lines correct gains <b>2</b> mark</p> <p>one or two correct gains <b>1</b> mark</p> <p>if there are more than 3 lines then lose mark for each extra line</p>	2
(b)(i)	covalent		1
(b)(ii)	four		1
(b)(iii)	hard		1
(b)(iv)	three		1
(b)(v)	soft		1
(c)	carbon	accept C	1
total			8

---

**CHY2F****Question 3**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)	gives out (heat)		1
(b)	D		1
(c)	L		1
(d)	magnesium chloride		1
total			4

**CHY2F****Question 4**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)(i)	ionic		1
(a)(ii)	elements		1
(b)(i)	chlorine (gas)	allow Cl <sub>2</sub> / Cl / Cl <sup>2</sup> allow chloride	1
(b)(ii)	hydrogen (gas)	allow H / H <sub>2</sub> / H <sup>2</sup>	1
(b)(iii)	sodium hydroxide (solution)	allow NaOH allow sodium solution	1
total			5



**CHY2F****Question 5**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)(i)	nitrogen + hydrogen → ammonia	accept full correct balanced equation	1
(a)(ii)	reversible (reaction) (owtte)	do <b>not</b> allow just ‘backwards’ (unqualified)	1
(a)(iii)	catalyst / speed up reaction	accept to lower activation energy	1
(a)(iv)	boiling point		1
(a)(v)	recycled (owtte)		1
(b)(i)	used to make explosives (owtte) used to make medicines (owtte)		1
(b)(ii)	used to make fertilisers (owtte)		1
(c)(i)	sensible answers such as provides workers (owtte) good transport links	ignore reference to raw materials	1

**continued...**

## CHY2F

## Question 5 continued...

question	answers	extra information	mark
(c)(ii)	sensible idea		1
	linked reason		1
	idea	linked reason	
	eg escape of chemicals /fumes /waste gases / pollution	harmful to health / environmental damage owtte do <b>not</b> allow harmful / damage / smell (unqualified)	
	risk of explosion	because of high pressures / may endanger local people / dangerous	
	risk of fire	because of high temperatures / may endanger local people	
	noise	any detrimental effect on quality of life <b>or</b> night and day	
	lorries / traffic unsightly	danger / noise / pollution etc detrimental effect on quality of life / house prices / reduced tourism	
	uses a lot of land	loss of habitats	
total			10

## CHY2F

## Question 6

question	answers	extra information	mark
(a)	sensible line of best fit which goes through or close to all the points <b>except</b> the anomalous point	allow wobbly / short double lines $\pm \frac{1}{2}$ square	1
(b)	loss of gas / loss of CO <sub>2</sub>	idea of gas produced / formed	1
(c)	7		1
(d)(i)	steeper line from around the same starting point and left of the points	allow crosses if they are fully correct for <b>1</b> mark	1
	levelling off at 99	accept short level line at 99 $\pm \frac{1}{2}$ square	1
(d)(ii)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• particles / molecules / atoms/ ions have more energy</li> <li>• move faster</li> <li>• collide <u>more</u> often or <u>more</u> chance of collisions or bump into each other <u>more</u></li> <li>• collide with <u>more</u> force / energy or <u>more</u> particles have the activation energy or <u>more</u> collisions result in reaction or <u>more</u> collisions are successful</li> </ul>	allow given / gain / get energy  ignore move about more ignore vibrate more / faster ignore collide quicker / faster	3
total			8

## CHY2F

## Question 7

question	answers	extra information	mark
(a)	any <b>one</b> from: <ul style="list-style-type: none"> <li>they are made of layers</li> <li>atoms / ions / particles / layers (of atoms) can slide over each other</li> </ul>	do <b>not</b> accept line / rows / lattice	1
(b)	any <b>one</b> from: <ul style="list-style-type: none"> <li>smaller / tiny <b>or</b> very small</li> <li>correct size range 1 to 100 nanometres</li> <li>a few hundred atoms in size</li> </ul>	do <b>not</b> allow small alone  if they state smaller and give a size outside range ignore size if it is less than 20,000	1
(c)	harder  plus <b>one</b> from: <ul style="list-style-type: none"> <li>so does not wear as quickly / erode as quickly</li> <li>less vulnerable to damage owtte</li> <li>because they have a high surface area to volume ratio</li> </ul> <b>or</b>  stronger (1) plus <b>one</b> from: (1) <ul style="list-style-type: none"> <li>less likely to break / do not break</li> <li>not as vulnerable to damage owtte</li> <li>do not bend out of shape</li> <li>because they have a high surface area to volume ratio</li> </ul>	ignore corrode  harder to wear down = <b>1</b> mark  accept withstand pressure  harder and stronger alone gains <b>1</b> mark	1  1
total			4

**CHY2F****Question 8**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
(a)	N <sub>2</sub> O		1
(b)	13.8 to 14	gains full marks without working  if answer incorrect 13 gains <b>1</b> mark <b>or</b> 14/101 × 100 gains <b>1</b> mark	2
total			3