



AQA Level 1/2 Certificate in Chemistry

PAPER 2

SPECIMEN MARK SCHEME

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 ecf 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.

4. Quality of communication and levels marking

In Question 3(b) candidates 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.

Candidates 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.

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry**COMPONENT NAME: Paper 2****STATUS: Specimen V5**

question	answers	extra information	mark
1(a)	base line drawn in ink which will run (and confuse the spots) or spots under water will dissolve into water / wash off	explanation must match problem	1 1
1(b)(i)	copper(II) and iron (III)		1
1(b)(ii)	orange / brown	accept rusty	1
1(b)(iii)	$\text{Fe}(\text{OH})_3$	accept formula of complex $[\text{Fe}(\text{H}_2\text{O})_3(\text{OH})_3]$ or any other formula for hydrated iron oxide, such as $\text{Fe}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$	1
1(c)(i)	distance moved by spot X : 2.1, distance moved by solvent from baseline: 5.0 cm	both needed for mark allow ± 0.1 cm accept answers in mm (21 and 50 ± 1 mm) and units stated as mm correct unit used at least once	1 1
1(c)(ii)	2.1 / 5.0 = 0.42	allow ecf from table ignore units given in answer for R_f	1
1(d)(i)	substances B and D	both required	1

Question 1 continues on the next page . . .

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry

COMPONENT NAME: Paper 2

STATUS: Specimen V5

Question 1 continued . . .

question	answers	extra information	mark
1(d)(ii)	do chromatography on mixture using ethanol or propanone as the solvent	accept conducting chromatography using any other solvent, but such answers cannot score second mark	1
	result gives different R_f values ie if ethanol solvent, B gives 0.62, D gives 0.45; if propanone, B gives 0.84, D gives 0.31		1
	or do chromatography on pure samples of B , D and mixture in ethanol or propanone (1) position of unknown spot will match that of either pure B or pure D in chromatogram (1)	allow water under same conditions as solvent	
Total			11

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry**COMPONENT NAME: Paper 2****STATUS: Specimen V5**

question	answers	extra information	mark
2(a)(i)	point at 20°C circled		1
	any one from:		1
	• too much water was added or water left in flask when rinsed out		
	• too little thiosulfate was added		
	• the temperature was lower than recorded		
2(a)(ii)	• a timing error was made		
2(a)(ii)	as the temperature increases, the time taken to go cloudy decreases		1
	or as the temperature increases the rate of reaction increases		
2(a)(iii)	the relationship is not linear		1
2(a)(iii)	20 (seconds)		1
2(a)(iv)	0.05		1
2(a)(v)	Yes		
	data using two temperatures 10 °C apart to show that the rate doubles		1
	justifying by repeating that step for another set of temperatures 10 °C apart		1
2(b)(i)	at 60 °C the time taken is very short / < 2 seconds	at higher temperatures more rapid heat loss makes it harder to achieve / keep target temperature	1
	so hard to measure or explained in terms of experimenter reaction time therefore the percentage error in measurement is greater		1

Question 2 continues on the next page . . .

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry

COMPONENT NAME: Paper 2

STATUS: Specimen V5

Question 2 continued . . .

question	answers	extra information	mark
2(b)(ii)	use more dilute solutions because this would make the reaction slower or longer time or use a light sensor (1) which eliminates human error or times can be read off a graph (1)	accept insulate because it reduces heat loss explanation must match suggested change	1 1
2(c)(i)	because greater depth (of cloudiness)		1
2(c)(ii)	there would be no change because (she is) looking through same amount of liquid		1 1
Total			15

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry**COMPONENT NAME: Paper 2****STATUS: Specimen V5**

question	answers	extra information	mark
3(a)(i)	20.9	reject any other answer	1
3(a)(ii)	start temp and end temp of water start mass and end mass of burner	if just 'temp of water and mass of burner' award 1 mark	1 1
3(a)(iii)	any two from: • mass of water used • distance between flame and calorimeter • length of wick		2
3(a)(iv)	to detect and discount any anomalous results in order to calculate a more accurate mean	accept to check that the results are reproducible	1 1
3(a)(v)	any two from: • heat losses • incomplete combustion • did not allow for energy used to raise temp of calorimeter / can • some water evaporates		2

Question 3 continues on the next page . . .

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry**COMPONENT NAME: Paper 2****STATUS: Specimen V5****Question 3 continued . . .**

3(b)			
Marks awarded for this answer will be determined by the quality of communication as well as the standard of the scientific response. Examiners should also refer to the information on page 4 and apply a best-fit approach to the marking.			
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is brief attempt at an evaluation of the use of fermentation of ethanol to produce biofuel, but it is unbalanced and may only mention advantages or disadvantages. There is no, or only a very weak attempt at, a conclusion.	There is some attempt at an evaluation, mentioning some advantages and disadvantages, but with some omissions or an obvious bias towards advantages or disadvantages. There is an attempt at a conclusion, but reasoning may be weak.	There is a clear, balanced and detailed evaluation, covering a wide range of both the advantages and the disadvantages. The conclusion presented is well reasoned and supported by the advantages and disadvantages listed.
Examples of science points made in response: advantages: • renewable or can plant more crops • carbon neutral or plants absorb carbon dioxide when growing to balance the carbon dioxide produced in burning so does not add to climate change • biodegrades easily • low energy / low temperature process • conserves finite crude oil reserves disadvantages: • crops take time to grow or can fail • large areas of land used up to grow crops • which are not then used for food • so can result in famines • or increase in food prices • fermentation process not continuous • further processing of ethanol solution formed is necessary Conclusion Sensible argued conclusion eg • overall ethanol is a good alternative as more important to conserve fossil fuels • overall not a good alternative because people could starve in countries producing crops for biofuels			
Total			15

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry

COMPONENT NAME: Paper 2

STATUS: Specimen V5

question	answers	extra information	mark
4(a)(i)	read meniscus (on burette) at eye level		1
	add acid dropwise (near previous endpoint) to the flask		1
	with swirling / mixing		1
	flask to be stood on white tile (or similar)		1
	stop adding acid when colour of indicator changed by one drop		1
	repeat to get concordant results		1
4(a)(ii)	any sensible precaution eg eye protection, gloves	do not accept tie hair back	1
4(b)	24.50	trailing zero required	1
	2.35		1
	22.15	allow ecf	1
4(c)	hard to detect change of colour (blue to purple)	accept blue and purple are (too) similar / hard to tell apart	1
4(d)(i)	23.30, 23.25 and 23.30	all 3 values required allow word description eg 'the last 3 values' or 'every value except the first one'	1
4(d)(ii)	$(23.30 + 23.25 + 23.30) / 3$		1
	23.28	correct answer to 2 decimal places with or without working gains 2 marks allow ecf from (d)(i) to 2 decimal places for 1 mark	1
4(e)(i)	$(22.30 \times 0.100) / 1000$		1
	0.00223	correct answer with or without working gains 2 marks failure to /1000, (= 2.23) gains 1 mark	1

Question 4 continues on the next page . . .

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry

COMPONENT NAME: Paper 2

STATUS: Specimen V5

Question 4 continued . . .

question	answers	extra information	mark
4(e)(ii)	0.00446	allow their (e)(i) x 2	1
4(e)(iii)	0.00446 / (25 / 1000) 0.178	correct answer with or without working gains 2 marks if no /1000 max 1 mark allow their (e)(ii) / (25 / 1000) for 1 mark	1 1
Total			19

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question	answers	extra information	mark
5(a)(i)	alkanes		1
	catalyst		1
5(a)(ii)	correct structure		1
	continuation bonds		1
	() _n around structure		1
5(b)(i)	orange		1
5(b)(ii)	propene: colourless		1
	poly(propene): orange		1
5(c)(i)	because poly(propene) is not biodegradable	owtte	1
5(c)(ii)	because there are weak forces between molecules	no bonds / cross links between molecules = first two points	1
	which need little energy to overcome		1
			1
5(d)(i)	held in place by cross links or held in place by covalent bonds		1
5(d)(ii)	idea of warming / heating		1
	by a suitable method		1
	the polymer does not become soft / bend		1
Total			16

COMPONENT NUMBER: AQA Level 1/2 Certificate in Chemistry

COMPONENT NAME: Paper 2

STATUS: Specimen V5

question	answers	extra information	mark
6(a)	cloudy	accept milky / white / turbid	1
6(b)(i)	apparatus allows gas to be collected, eg gas syringe or over water		1
	method of gas collection would allow volume to be measured – gas syringe or labelled measuring cylinder or eudiometer or graduations shown on collecting tube		1
6(b)(ii)	axes labelled		1
	all points correct (2 marks, –1 per error)	points must be plotted to nearest grid line or better	2
	smooth curve drawn		1
6(b)(iii)	graph levels out or does not change after 5 minutes	accept gas volume becomes constant or graph shows rate of reaction is zero	1
6(c)(i)	because the final gas volume is the same		1
6(c)(ii)	she did not heat it as strongly		1
6(d)(i)	moles $\text{NaHCO}_3 = 0.672 / 84 = 0.008$ and so moles $\text{Na}_2\text{CO}_3 = 0.008 / 2 = 0.004$ mass $\text{Na}_2\text{CO}_3 = 106 \times 0.004 = 0.424$	give full credit for calculation by ratio of mass	1
		ecf from 'their' 0.004 correct answer with or without working gains both marks	1
6(d)(ii)	solid not fully decomposed reheat it – mass will decrease or impurities are present that do not decompose on heating (1) reheat it – mass will stay constant (1)		1
			1
Total			14