

Additional Applied Science A

General Certificate of Secondary Education

Unit **A335/02**: Harnessing Chemicals (Higher Tier)

Mark Scheme for January 2012

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant – applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response

	no benefit of doubt
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Subject-specific Marking Instructions

- If a candidate alters his/her response, examiners should accept the alteration.
- Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

Eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

c. The list principle:
 If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

d. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Answer	Marks	Guidance												
1	(a)	any THREE from use foam; use breathing apparatus / fire kit; do not wash into drains; evacuate (people nearby)	3	use list principle if more than three answers												
	(b)	to protect people / driver; to protect the environment (owtte)	2													
2	(a)	(i)	15	1												
		(ii)	6	1												
	(b)	(i)	use up all the acid / reaction complete	1	allow maximise yield / make as much product as possible											
		(ii)	filter	1	allow decant											
		(iii)	2.8 / 56 x 152 ; = 7.6 (g)	2	correct answer gets both marks											
(c)	ZnO; ZnSO ₄ + H ₂ O	2	correct formula for ZnO or ZnSO ₄ = 1 mark all three formulae correct = 2 marks													
3	(a)	(i)	speed up the reaction/reduce time taken	1												
		(ii)	condense (vapours); prevent loss of (volatile) substances	2	allow reduce risk of fire (1) allow ensure complete reaction (1)											
(b)	(i)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tbody> <tr> <td>C₃H₇OH</td> <td style="text-align: center;">✓</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>C₄H₉COOH</td> <td style="text-align: center;">✓</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	C ₃ H ₇ OH	✓							C ₄ H ₉ COOH	✓			2	
C ₃ H ₇ OH	✓															
C ₄ H ₉ COOH	✓															

Question		Answer	Marks	Guidance
	(ii)	sulfuric (acid)	1	allow correct formula / alternative spelling
4	(a) (i)	5 points correctly plotted	2	4 points correctly plotted = 1 mark
	(ii)	smooth best fit line	1	
	(b)	gas / carbon dioxide has been lost from the flask	1	allow gas has been made
	(c)	to prevent spray / loss of acid (and permit loss of gas)	1	
	(d)	reaction has stopped / chips stop dissolving; acid has run out; no more gas given off	2	ignore marble chips have run out
	(e)	larger surface area	1	allow powder is smaller particles (than the chips)
	(f)	same amount of <u>acid</u> ; marble is in excess / not limiting	2	
5	(a)	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C} \\ \quad \diagup \\ \text{H} \quad \text{O} \\ \quad \quad \quad \diagdown \\ \quad \quad \quad \text{O} \end{array} $	1	
	(b) (i)	changes / increases rate of reaction; remains unchanged / can be reused (owtte)	2	
	(ii)	two from one off purchase / not used up / can be reused; increases throughput / more product per unit time; allows lower temperature	2	allow benefit outweighs initial cost ignore reaction is quicker unless qualified ignore increases yield
	(iii)	less expensive; higher yield	2	
Total			36	

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