OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

Unit **A321/01**: Modules C1, C2, C3 (Foundation Tier)

Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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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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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.

2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).

4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	=	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

eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)
"work done" = 0 marks
"work done lifting" = 1 mark
"change in potential energy" = 0 marks
"gravitational potential energy" = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.

6. 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.

   The example below illustrates how to apply this principle to an objective question.

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.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	☒
☐	☐	☒
✓	☒	✓
☒	☒	✓
☐	☐	☐
This would be worth zero marks.	*This would be worth one mark.*	*This would be worth one mark.*

7. 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.

8. 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 <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>emulsifiers (1)
(artificial) sweeteners (1)
preservatives (1)</td><td>[3]</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><th></th><th>true</th><th>false</th></tr><tr><td>... always harmful to health.</td><td></td><td>✓</td></tr><tr><td>All are artificial chemicals.</td><td></td><td>✓</td></tr><tr><td>... passed a safety test.</td><td>✓</td><td></td></tr><tr><td>Some are natural chemicals.</td><td>✓</td><td></td></tr><tr><td>... for use in the EU.</td><td>✓</td><td></td></tr><tr><td>... throughout the world.</td><td></td><td>✓</td></tr></table></td><td>[3]</td><td>all six correct = 3 marks
five correct = 2 marks
four or three correct = 1 mark</td></tr>
<tr><td></td><td>(c)</td><td></td><td>describes a risk or benefit associated with an additive eg health worries (1)
and
she buys when she thinks the benefit is greater than the risk / she does not buy when she thinks the risk is greater than the benefit (1)</td><td>[2]</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>[8]</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
2*	(a)		carbon hydrogen oxygen	[2]	all three correct = 2 marks two correct = 1 mark if more than three circled one mark deduced for each extra one circled
	(b)		**any two from:** nitrification by bacteria / nitrogen fixing bacteria; absorption by plants from soil; consumption of living organisms / animals eating / animals drinking; decay / decomposition / denitrification; excretion / egestion / manure; respiration / exhalation / inhalation / breathing; photosynthesis;	[2]	**accept** other correct processes **ignore** combustion / lightning
	(c)		☐ Plants take nitrogen compounds … ☑ (1) ☐ ☐ When crops are harvested … ☑ (1)	[2]	
			Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
3	(a)*		**first mark** for idea that making new paper and making recycled paper involves a difference in energy used/pollution created **plus any two differences between new and recycled paper shown in the diagram, from**: *1 cutting trees* for new paper trees have to be cut but for recycled paper they do not, so jobs involved are different; *2 transport* transporting/collecting waste paper for recycling may be for greater/less distance than transporting cut trees for new paper; *3 de-inking and bleaching* recycled paper has to be de-inked/bleached but not new paper; *4 debarking and chipping* trees have to be debarked/chipped for new paper but not for recycled paper; *5 screening and cleaning* contaminants are different for new and recycled paper (so screening and cleaning is different);	[3]	do **not** allow marks for answers that only refer to cutting trees being less sustainable because it reduces number of trees etc / recycled paper being more sustainable since it re-uses material rather than using up resources etc first marking point must refer to energy used or pollution created or environmental impact being different for the two processes for making paper examples of differences between new paper and recycled paper must be from the diagram to score marks **accept** implied differences
	(b)		pulping (1) both involve (heating with) chemicals/ beating into a pulp (1)	[2]	

Question			Expected Answers	Marks	Additional Guidance
3	(c)		☐ ☐ ☐ Paper in landfill … gives off methane... ✓ (1) ☐ Burning waste paper gives off … ✓	[2]	
			Total	[7]	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		☐ carbon ☑ (1) hydrogen ☑ (1) ☐ ☐	[2]	
	(b)		polymerisation (1)	[1]	
	(c)	(i)	B (1)	[1]	
		(ii)	C (1)	[1]	
		(iii)*	make polymer chains longer ☑ (1) introduce more cross links ☑ (1) ☐ ☐ ☐	[2]	
			Total	[7]	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		water (1)	[1]	
	(b)		increases increases / decreases decreases (1)	[1]	
	(c)	(i)	(160+158+159+157+156)/5 (1) = 158 (1)	[2]	158 without working scores 2 marks
		(ii)	… limit to the accuracy … ☐ ✓ (1) … carbon dioxide made … varies … ☐ ✓ (1)	[2]	
		(iii)	120 (1)	[1]	
		(iv)*	more people using public transport ... ☐ ✓ (1) having emissions limits forced by … ☐ ✓ (1)	[2]	
			Total	[9]	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		carbon dioxide and sulfur dioxide	[1]	**both** required no mark if three or four answers given
	(b)*		sulfur dioxide causes acid rain (1) harms trees/harms fish/harms crops/erosion of buildings (1)	[2]	**allow** sulfur dioxide makes sulfuric acid second mark must link to first statement **allow** carbon dioxide causes greenhouse effect (1) this results in climate change / global warming (1)
	(c)		first molecule of carbon dioxide on right ○●○ (1) second molecule of carbon dioxide ○●○ (1)	[2]	two white circles must both touch black circle but not touch each other they need not be drawn linearly
			Total	[5]	

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