

# **Chemistry A**

General Certificate of Secondary Education

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

## **Mark Scheme for January 2011**

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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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Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

## 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
<b>not/reject</b>	= answers which are not worthy of credit
<b>ignore</b>	= statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	= answers that can be accepted
(words)	= words which are not essential to gain credit
<u>words</u>	= 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.

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

This would be worth zero marks.

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 one mark.

Put ticks (✓) in the two correct boxes.

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

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	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Manchester	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Paris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Southampton	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

Question		Expected Answers	Marks	Additional Guidance																					
1	(a)	emulsifiers (1) (artificial) sweeteners (1) preservatives (1)	[3]																						
	(b)	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <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> </tbody> </table>		true	false	... always harmful to health.		✓	All are artificial chemicals.		✓	... passed a safety test.	✓		Some are natural chemicals.	✓		... for use in the EU.	✓		... throughout the world.		✓	[3]	all six correct = 3 marks five correct = 2 marks four or three correct = 1 mark
	true	false																							
... always harmful to health.		✓																							
All are artificial chemicals.		✓																							
... passed a safety test.	✓																								
Some are natural chemicals.	✓																								
... for use in the EU.	✓																								
... throughout the world.		✓																							
	(c)	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)	[2]																						
<b>Total</b>			<b>[8]</b>																						

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 deducted for each extra one circled
(b)	<b>any two from:</b> 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]	<b>accept</b> other correct processes  <b>ignore</b> combustion / lightning
(c)	<div style="text-align: right; margin-right: 20px;"> <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/> </div> Plants take nitrogen compounds ...  When crops are harvested ... <input checked="" type="checkbox"/> (1)	[2]	
<b>Total</b>		<b>[6]</b>	



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

Question		Expected Answers	Marks	Additional Guidance
3	(c)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Paper in landfill ... gives off methane... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> Burning waste paper gives off ... <input checked="" type="checkbox"/>	[2]	
		<b>Total</b>	<b>[7]</b>	



Question		Expected Answers	Marks	Additional Guidance
4	(a)	<div style="text-align: center;"> <input type="checkbox"/>            carbon <input checked="" type="checkbox"/> (1)            hydrogen <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/> </div>	[2]	
	(b)	polymerisation (1)	[1]	
	(c) (i)	B (1)	[1]	
	(ii)	C (1)	[1]	
	(iii)*	make polymer chains longer <input checked="" type="checkbox"/> (1) introduce more cross links <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[2]	
<b>Total</b>			[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)	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 80%;"> <p>... limit to the accuracy ...</p> <p>... carbon dioxide made ... varies ...</p> </div> <div style="width: 15%; text-align: center;"> <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)  <input type="checkbox"/> </div> </div>	[2]	
	(iii)	120 (1)	[1]	
	(iv)*	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 80%;"> <p>more people using public transport ...</p> <p>having emissions limits forced by ...</p> </div> <div style="width: 15%; text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)                 </div> </div>	[2]	
<b>Total</b>			[9]	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	carbon dioxide and sulfur dioxide	[1]	<b>both</b> 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]	<b>allow</b> sulfur dioxide makes sulfuric acid  second mark must link to first statement  <b>allow</b> 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
<b>Total</b>			[5]	

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**14 – 19 Qualifications (General)**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

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