

Chemistry A

General Certificate of Secondary Education

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

Mark Scheme for June 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.

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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
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
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

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. 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.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

✗
✗

*This would be worth
1 mark.*

✓
✗

*This would be worth
0 marks.*

✗
✗
✓
✓

*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, e.g. 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-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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.

e.g. if a question requires candidates to identify cities in England:

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


- e. For answers marked by levels of response:
- i. **Read through the whole answer from start to finish**
 - ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
 - iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- iv. Use the **L1, L2, L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question		Answer	Marks	Guidance
1	(a)	argon (1) CO ₂ (1) 78 (1)  (1)	4	each row completely correct for 1 mark formulae completely correct, numbers subscript reject if there is a gap between the atoms
	(b)	by photosynthesis (1) by dissolving in rain/rivers/lakes/sea/sedimentary rocks (1)	2	ignore water
	(c)	nitrogen dioxide/nitrogen monoxide/nitrogen oxides (1) carbon monoxide (1)	2	accept formulae if correct accept unburnt hydrocarbons / carbon particulates (1)
Total			8	

Question		Answer	Marks	Guidance
2	(a)	increases ... decreases (2) / decreases ... increases (2)	2	allow eg goes up for increases etc
	(b) (i)	works out a mean/average (even if incorrect) (1) $26/5 = 5.2$ (1)	2	allow 2 marks for 5.2 without working shown
	(ii)	<i>any two from:</i> wind blowing air around/change in wind direction/wind strength/ (1) nearby traffic could vary (1) output from a nearby power station could vary (1) variation in measuring equipment/human error (1)	2	accept any reasonable answer related to possible sources from factories ignore more/less rain ignore more/less SO ₂
Total			6	

Question		Answer	Marks	Guidance												
3	(a)	(glass) acid rain caused by sulfur dioxide/NO _x (1) more sulfur dioxide/NO _x from glass manufacture (1) OR (glass) acid rain caused by carbon dioxide, sulfur dioxide and NO _x (1) carbon dioxide causes acidity less than the other two (1)	2	accept reverse argument throughout answer needs to convey the idea of a comparison												
	(b)	(i)	$(4.7 + 2.2) \times 5 = 34.5$	1												
		(ii)	$7.2 + (2.5 \times 5) = 19.7$	1												
		(iii)	(glass) (in energy terms) glass is more sustainable (1) because less energy used (for five/many deliveries in total) (1) or if b(i) is less than b(ii) (plastic) (in energy terms) plastic is more sustainable (1) because less energy used (1) but energy needed to wash/collect glass bottles is not taken into account (1)	2 allow ecf from bi/bii												
		(iv)	<table border="1"> <tbody> <tr> <td>The environmental impact of making the material.</td> <td></td> </tr> <tr> <td>The energy input for making the material.</td> <td></td> </tr> <tr> <td>The cost of disposal of the product.</td> <td></td> </tr> <tr> <td>The energy input for making the product.</td> <td>✓</td> </tr> <tr> <td>The environmental impact of using the product.</td> <td></td> </tr> <tr> <td>The energy input for using the product.</td> <td>✓</td> </tr> </tbody> </table>	The environmental impact of making the material.		The energy input for making the material.		The cost of disposal of the product.		The energy input for making the product.	✓	The environmental impact of using the product.		The energy input for using the product.	✓	2
The environmental impact of making the material.																
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Total			8													

Question		Answer	Marks	Guidance															
4	(a)	<table border="1"> <thead> <tr> <th></th> <th>(✓) one chemical</th> <th>(✓) mixture of chemicals</th> </tr> </thead> <tbody> <tr> <td>copper</td> <td>✓</td> <td></td> </tr> <tr> <td>milk</td> <td></td> <td>✓</td> </tr> <tr> <td>paint</td> <td></td> <td>✓</td> </tr> <tr> <td>petrol</td> <td></td> <td>✓</td> </tr> </tbody> </table>		(✓) one chemical	(✓) mixture of chemicals	copper	✓		milk		✓	paint		✓	petrol		✓	2	all four correct = 2 marks two or three correct = 1 mark
	(✓) one chemical	(✓) mixture of chemicals																	
copper	✓																		
milk		✓																	
paint		✓																	
petrol		✓																	
	(b)	hydrocarbons (1) carbon (1) (and) hydrogen (1) lengths (1)	4	allow carbon and hydrogen in either order															
		Total	6																

Question		Answer			Marks	Guidance														
5	(a)	Metaldehyde helps to protect crops.			2															
		The European limit is set well below the level that could cause harm to people.					✓													
		It is not possible for anything to be completely safe.																		
		People do not drink very much water.																		
Water samples are rarely above the limit.			✓																	
	(b)	the benefit outweighs the risk (1) (the benefit is large) because it prevents crops from being damaged/higher yield of crop/better profit/(1) (the risk is small) because the level that gets into the <u>water</u> is so low (1)			3															
	(c)	(i)	<table border="1"> <thead> <tr> <th>crop treatment</th> <th>can be used (✓)</th> <th>cannot be used (✓)</th> </tr> </thead> <tbody> <tr> <td>spread manure</td> <td>✓</td> <td></td> </tr> <tr> <td>spread synthetic fertiliser</td> <td></td> <td>✓</td> </tr> <tr> <td>spray synthetic pesticides and herbicides</td> <td></td> <td>✓</td> </tr> <tr> <td>weed by hand</td> <td>✓</td> <td></td> </tr> </tbody> </table>	crop treatment	can be used (✓)	cannot be used (✓)	spread manure	✓		spread synthetic fertiliser		✓	spray synthetic pesticides and herbicides		✓	weed by hand	✓		2	all four correct = 2 marks two or three correct = 1 mark
crop treatment	can be used (✓)	cannot be used (✓)																		
spread manure	✓																			
spread synthetic fertiliser		✓																		
spray synthetic pesticides and herbicides		✓																		
weed by hand	✓																			

Question		Answer	Marks	Guidance
	(ii)	pick off by hand	1	allow spray with soap/use beer traps/spread coffee/use nematodes/nets ignore organic pesticides
Total			8	

Question		Answer	Marks	Guidance
6	(a)	smaller molecules are soluble (1) they can be absorbed (1) into the blood stream (1)	3	ora
	(b)	amino acids liver urea kidneys urine	3	all five correct = 3 marks four correct = 2 marks two or three correct = 1 mark
Total			6	

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