

Chemistry A

General Certificate of Secondary Education

Unit **A322/01**: Modules C4, C5, C6 (Foundation 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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





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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

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

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 checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<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)	<p>the flames flash at different rates <input type="checkbox"/></p> <p>different colours in the flame <input checked="" type="checkbox"/></p> <p>sodium burns much faster than potassium <input type="checkbox"/></p> <p>the height of the flames is different in each test <input type="checkbox"/></p>	1	
	(b)	(i)	2	do not allow "more lines in sodium" not "dark/light lines" in place of thickness/ colour
		(ii)	2	ignore "spectra are the same"

Question		Answer	Marks	Guidance
1	(c)	lithium / Li 2.8.1 19	2	if the name is missing allow correct symbol for lithium ie not Li ₂ / li / LI 3 correct = 2 marks 2/1 correct = 1 mark
		Total	7	

Question			Answer	Marks	Guidance
2	(a)	(i)	<p>the surface bubbles and fizzes <input type="checkbox"/></p> <p>a flame appears <input type="checkbox"/></p> <p>the surface changes from shiny to dull <input checked="" type="checkbox"/></p> <p>the piece of lithium gets smaller <input type="checkbox"/></p>	1	
		(ii)	lithium + oxygen → lithium oxide	2	1 mark for LHS and 1 mark RHS (1) all correct (2) if formulae given as well as words, then ignore the formulae if formulae alone used, then must be all correct, but ignore balancing
	(b)	(i)	<p>the lithium moves around <input checked="" type="checkbox"/></p> <p>the lithium sinks to the bottom of the water <input type="checkbox"/></p> <p>the level of the water rises <input type="checkbox"/></p> <p>the piece of lithium gets bigger <input type="checkbox"/></p> <p>the lithium fizzes and bubbles form <input checked="" type="checkbox"/></p>	2	
		(ii)	hydrogen (1)	1	
	(c)	(i)	97 °C (1)	1	
		(ii)	Lithium/ Li (1)	1	if symbol given, then must be correct – but if the name is given with incorrect symbol, then ignore the symbol
			Total	8	

Question		Answer	Marks	Guidance															
3	(a)	<table border="1"> <thead> <tr> <th>what each part contains</th> <th>part of the Earth</th> <th>scientific name</th> </tr> </thead> <tbody> <tr> <td>compounds including ...</td> <td>the oceans</td> <td>hydrosphere</td> </tr> <tr> <td>mainly water with some ...</td> <td>outer hard layer of the Earth</td> <td>biosphere</td> </tr> <tr> <td>a mixture of minerals</td> <td>living things</td> <td>lithosphere</td> </tr> </tbody> </table>	what each part contains	part of the Earth	scientific name	compounds including ...	the oceans	hydrosphere	mainly water with some ...	outer hard layer of the Earth	biosphere	a mixture of minerals	living things	lithosphere	4	LHS fully correct = 2 marks 1 or 2 correct = 1 mark RHS fully correct = 2 marks 1 or 2 correct = 1 mark			
what each part contains	part of the Earth	scientific name																	
compounds including ...	the oceans	hydrosphere																	
mainly water with some ...	outer hard layer of the Earth	biosphere																	
a mixture of minerals	living things	lithosphere																	
	(b)	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>There are only very weak attractions between molecules in the air.</td> <td>✓</td> <td></td> </tr> <tr> <td>Oxygen and nitrogen are non-metals.</td> <td>✓</td> <td></td> </tr> <tr> <td>The air is our main source of minerals and metals.</td> <td></td> <td>✓</td> </tr> <tr> <td>Carbon dioxide is an example of a gas in the air that is a compound.</td> <td>✓</td> <td></td> </tr> </tbody> </table>		true	false	There are only very weak attractions between molecules in the air.	✓		Oxygen and nitrogen are non-metals.	✓		The air is our main source of minerals and metals.		✓	Carbon dioxide is an example of a gas in the air that is a compound.	✓		2	all correct = 2 marks 2/3 correct = 1 mark
	true	false																	
There are only very weak attractions between molecules in the air.	✓																		
Oxygen and nitrogen are non-metals.	✓																		
The air is our main source of minerals and metals.		✓																	
Carbon dioxide is an example of a gas in the air that is a compound.	✓																		
		Total	6																

Question	Answer	Marks	Guidance
4	<p>similarity: both contain carbon, hydrogen <u>and</u> oxygen;</p> <p>all bonds are covalent;</p> <p>maximum of three from: difference: contain different numbers of carbon, hydrogen <u>and</u> oxygen;</p> <p>sugar contains more carbon / 6 carbons in sugar and 3 carbons in the amino acid;</p> <p>sugar contains more hydrogen / 12 hydrogens in sugar and 7 hydrogens in the amino acid ;</p> <p>sugar contains more oxygen / 6 oxygen in sugar and 2 in the amino acid;</p> <p>amino acid contains nitrogen and/or sulfur / more (different) elements ora;</p> <p>amino acid is a smaller / lighter molecule / fewer (total) atoms;</p> <p>sugar is a chain (molecule) / amino acid (molecule) is branched;</p>	4	<p>4 marks <u>must include</u> at least one similarity.</p> <p>ignore contain C, H and O (not enough)</p> <p>ignore 'more Cs' or 'more Hs' or 'more Os' if numbers are given, they must be correct. ignore C₆ / C⁶ etc.</p> <p>ignore 'sugar is straight / amino acid is round' or similar</p>
	Total	4	

Question		Answer	Marks	Guidance
5	(a)	<p>lots of common rocks contain silicon dioxide <input type="checkbox"/></p> <p>silicon forms strong bonds with oxygen <input type="checkbox"/></p> <p>silicon and oxygen have the highest percentages in the table <input checked="" type="checkbox"/></p> <p>the percentage of silicon is lower than oxygen <input type="checkbox"/></p>	1	
	(b)	<p><input type="text" value="copper"/> <input type="text" value="very large amounts ..."/></p> <p><input type="text"/></p> <p><input type="text" value="aluminium"/> <input type="text" value="The metal can only be ..."/></p> <p><input type="text"/></p>	2	
Total			3	

Question			Answer	Marks	Guidance
6	(a)	(i)	sulfuric (acid) H_2SO_4	1	both needed do not accept H_2SO_4 / H^2SO_4 ; numbers should be half way down the letters or lower.
		(ii)	hydrogen H_2	1	both needed do not accept H_2 / H^2
	(b)	(i)	Rose/ bigger lumps/ smaller surface area slower reaction (1) Luke/ increased concentration faster reaction (1)	2	allow takes more time (Rose) allow takes less time (Luke) if "more acid" stated in response for concentration – do not allow if "more zinc" stated in response for bigger lumps – do not allow
		(ii)	time measurement (1) volume measurement (1)	2	allow for 1 mark how long it takes (for the solid to disappear/ for the gas to be made) allow for 1 mark how much gas/ amount of gas allow for 2 marks how long it takes for all of the gas to be made allow appropriate description of method to collect gas for 1 mark
	(c)		zinc carbonate zinc oxide zinc hydroxide	2	all 3 correct for two marks 2 correct for 1 mark
			Total	8	

Question		Answer	Marks	Guidance												
7	(a)	corrosive (1)	1													
	(b)	<p>type of acid state symbol</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 30%;">citric acid solid</td> <td style="border: 1px solid black; padding: 5px; width: 30%;"></td> <td style="border: 1px solid black; padding: 5px; width: 30%;">(l)</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">sulfuric acid liquid</td> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">(g)</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">hydrogen chloride gas</td> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">(s)</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">dilute acid dissolved in water</td> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">(aq)</td> </tr> </table>	citric acid solid		(l)	sulfuric acid liquid		(g)	hydrogen chloride gas		(s)	dilute acid dissolved in water		(aq)	2	all correct = 2 marks 2 / 3 correct = 1 marks 1 correct = 0
citric acid solid		(l)														
sulfuric acid liquid		(g)														
hydrogen chloride gas		(s)														
dilute acid dissolved in water		(aq)														
	(c)	<p>acid formula</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 30%;"></td> <td style="border: 1px solid black; padding: 5px; width: 30%;"></td> <td style="border: 1px solid black; padding: 5px; width: 30%;">CH₃COOH</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">hydrochloric acid</td> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">HNO₃</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">nitric acid</td> <td style="border: 1px solid black; padding: 5px;"></td> <td style="border: 1px solid black; padding: 5px;">HCl</td> </tr> </table>			CH ₃ COOH	hydrochloric acid		HNO ₃	nitric acid		HCl	2	all correct = 2 marks 1 correct = 1 mark			
		CH ₃ COOH														
hydrochloric acid		HNO ₃														
nitric acid		HCl														
	(d)	neutralisation (1)	1													
Total			6													

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