

# **Chemistry A**

General Certificate of Secondary Education

Unit **A322/01**: Modules C4, C5, C6 (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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## 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, e.g. 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

*e.g. 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.

*e.g. for a one mark question, where ticks in boxes 3 and 4 are required for the mark*

Put ticks (✓) in  
the two correct  
boxes.

✓
<del>✓</del>

*This would be  
worth zero marks.*

Put ticks (✓) in  
the two correct  
boxes.

<del>✓</del>
<del>✓</del>

*This would be  
worth one mark.*

Put ticks (✓) in  
the two correct  
boxes.

<del>✓</del>
<del>✓</del>
✓
✓

*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, 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.

## 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, e.g. 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.

*e.g. 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		✓		✓	✓		✓	
<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	i	sodium (1) Cs (1)	[2]	not CS or cs
		ii	any one from: lithium; francium;	[1]	spelling must be correct <b>allow</b> correct symbols: Li for lithium, Fr for francium
	b	i	hydrogen (1)	[1]	no mark if two answers ringed
		ii	<div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>            An alkali is made. <input checked="" type="checkbox"/> (1)  <input type="checkbox"/> </div>	[1]	
	c		Caesium is more reactive than ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	

Question			Expected Answers	Marks	Additional Guidance
1	d	i	<p><b>any three from:</b></p> <p>(solution) goes purple/blue;</p> <p>gas is made / fizzing / bubbles;</p> <p>flash / explosion / flame;</p> <p>(flame is) purple/lilac;</p> <p>potassium moves around;</p> <p>floats / is on top of water;</p> <p>melts / forms a ball;</p> <p>it disappears / gets smaller;</p> <p>reaction is slower (than the other metals Gemma has used) / reaction is slower than caesium/rubidium / reaction is faster than sodium/lithium / faster than those above it / slower than those below it;</p>	[3]	<p><b>do not allow</b> things that cannot be seen eg forms an alkali/hydrogen</p> <p><b>allow</b> three correct marking points even if they are amongst some incorrect answers</p> <p><b>ignore</b> hydrogen is made</p> <p><b>allow</b> it will burn / it catches fire</p> <p>if say faster must be qualified eg by referring to sodium/lithium</p> <p><b>allow</b> less violent/more violent, smaller explosion/bigger explosion, more reactive/less reactive instead of slower/faster</p>

Question			Expected Answers	Marks	Additional Guidance											
1	d	ii	<p><b>any two from:</b></p> <p>identifies a specific hazard eg explosion / flame / something may spit out / glass bowl may break;</p> <p>produces a <u>corrosive</u> hydroxide/alkali/substance;</p> <p>identifies possible damage eg to skin/eyes;</p> <p>idea that safety screen is a barrier to prevent contact/protect from contact with material;</p>	[2]	<p><b>ignore</b> something may hit you (not specific enough)</p> <p><b>ignore</b> hazardous / dangerous / it gets on you</p> <p><b>ignore</b> to prevent/protect from harm/injury unqualified</p>											
			<b>Total</b>	<b>[11]</b>												
2	a	i	neutrons (1)	[1]	<b>allow</b> phonetic spellings, but do not allow neurons											
		ii	2.4 (1)	[1]												
		iii	6 (1)	[1]												
	b		<table border="0" style="width: 100%; text-align: center;"> <tr> <td><b>mass</b></td> <td><b>particle</b></td> <td><b>charge</b></td> </tr> <tr> <td><input type="text" value="0"/></td> <td rowspan="2">electron</td> <td><input type="text" value="-1"/></td> </tr> <tr> <td><input type="text" value="1"/></td> <td><input type="text"/></td> </tr> <tr> <td><input type="text"/></td> <td>proton</td> <td><input type="text" value="+1"/></td> </tr> </table>	<b>mass</b>	<b>particle</b>	<b>charge</b>	<input type="text" value="0"/>	electron	<input type="text" value="-1"/>	<input type="text" value="1"/>	<input type="text"/>	<input type="text"/>	proton	<input type="text" value="+1"/>	[1]	<p>all three lines correct</p> <p>no mark if two or more lines are drawn from or to one box</p>
<b>mass</b>	<b>particle</b>	<b>charge</b>														
<input type="text" value="0"/>	electron	<input type="text" value="-1"/>														
<input type="text" value="1"/>		<input type="text"/>														
<input type="text"/>	proton	<input type="text" value="+1"/>														
			<b>Total</b>	<b>[4]</b>												

Question	Expected Answers	Marks	Additional Guidance	
3	a	N <sub>2</sub> and O <sub>2</sub> (1)	[1]	both needed for one mark
	b	N <sub>2</sub> O <sub>4</sub> (1)	[1]	
	c	below and below (1) molecular and weak (1)	[2]	<b>allow</b> wrong choice crossed out as indication for each pair
	d	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">N<sub>2</sub>O<sub>4</sub></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">N<sub>2</sub>O</div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 30px; margin-right: 10px;"></div> </div> </div>	[2]	<p>one mark for each correct line</p> <p>two lines to or from one box loses the mark for that box</p>
		<b>Total</b>	<b>[6]</b>	



Question		Expected Answers	Marks	Additional Guidance
4	a	$C_2H_5NO_2$ C H N and O given (1) correct numbers (1)	[2]	<b>ignore</b> order in which elements are written <b>do not allow</b> lower case symbols, eg h, for first mark, but can score second mark for correct numbers cannot score second mark if any symbols are missing/incorrect
	b	<b>i</b> <b>any two from:</b> (they contain) carbon / both have a carbon chain; (they contain) oxygen; (they contain) hydrogen; (they contain) nitrogen;	[2]	<b>allow</b> correct symbols instead of a names they have $NH_2/COOH/CH_2 = 2$ marks
		<b>ii</b> <b>any two from:</b> different numbers of atoms / B has more atoms / molecule B is larger; different number of carbon/C atoms / B has more carbon/C (atoms) / B has longer carbon chain; different number of hydrogen/H atoms / B has more hydrogen/H (atoms); B contains sulfur/S (atom) / B has more elements / B has different atoms;	[2]	<b>allow</b> ORA for all points
	c	carbohydrates (1) proteins (1)	[2]	one mark lost for each ringed answer over two
<b>Total</b>			[8]	

Question		Expected Answers	Marks	Additional Guidance	
5	a	<p style="text-align: center;"> <input type="checkbox"/>            pH meter <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </p>	[1]		
	b	i	<p style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>            sodium hydroxide <input checked="" type="checkbox"/> (1)         </p>	[1]	
		ii	<p><b>any three from:</b></p> <p>add the vinegar (to the flask) (1)</p> <p>use small amounts at a time idea / dropwise / slowly (1)</p> <p>stir / swirl / mix / use white tile (1)</p> <p>(add vinegar) until a colour change is seen (1)</p>	[3]	<b>allow</b> until end point is reached/reaction is complete

Question			Expected Answers	Marks	Additional Guidance
5	c	i	chip shop vinegar <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	
	c	ii	(hydrogen) 1 <b>and</b> (oxygen) 16 (1) relative formula mass = 60 (1)	[2]	
	c	iii	an equation for the reaction <input checked="" type="checkbox"/> <input type="checkbox"/> the concentration of the alkali used <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	<b>both ticks</b> required for one mark
			<b>Total</b>	<b>[9]</b>	

Question			Expected Answers	Marks	Additional Guidance
6	a	i	copper sulfate (1)	[1]	<b>allow</b> copper sulphate <b>do not allow</b> copper sulfide <b>allow</b> correct formula CuSO <sub>4</sub> <b>ignore</b> carbon dioxide/CO <sub>2</sub> and water/H <sub>2</sub> O if given as additional answers
		ii	CO <sub>2</sub> H <sub>2</sub> O	[1]	both required if three or more answers ringed no mark
	b		<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 60%;">           heat the acid         </div> <div style="width: 35%; text-align: center;"> <input type="checkbox"/>  <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/>            use a higher concentration of acid <input checked="" type="checkbox"/> (1)         </div> </div>	[2]	
<b>Total</b>				[4]	

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