

Chemistry A

Twenty First Century Science Suite

General Certificate of Secondary Education J634

Mark Scheme for the Units

January 2010

J634/MS/R/10J

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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
<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. Annotations:
The following annotations are available on SCORIS.

✓	= correct response
✗	= incorrect response
bod	= benefit of the doubt
nbod	= benefit of the doubt not given
ECF	= error carried forward
^	= information omitted
I	= ignore
R	= reject

6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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 0 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.

8. 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.

9. 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"/>
Score:	2	2	1	1	1	1	0	0	0	NR

A321/01 Modules C1, C2, C3 Foundation Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	E (1)	[1]	
		ii	B (1)	[1]	
		iii	A (1)	[1]	
		iv	F (1)	[1]	
	b	i	<div style="text-align: right;"><input type="checkbox"/></div> <p>from the exhaust of car engines <input checked="" type="checkbox"/> (1)</p> <p>from oil-burning power stations <input checked="" type="checkbox"/> (1)</p> <div style="text-align: right;"><input type="checkbox"/></div>	[2]	
		ii	<p>any two from: nitrogen dioxide dissolves in water; reacts with oxygen; forms acid rain;</p> <p>plus effect of acid rain eg erodes buildings / kills fish / kills trees (1)</p>	[3]	<p>ignore references to global warming</p> <p>allow makes lakes acidic allow harms/damages trees/fish allow damages/corrodes buildings do not allow burns buildings ignore references to asthma etc</p>
Total				[9]	

Question		Expected Answers	Marks	Additional Guidance															
2	a	as the number of vehicles increases the number of particulates increases / there is a <u>positive</u> correlation (between number of vehicles and particulate concentration) (1)	[1]	allow reverse answer – decreases and decreases allow alternatives for increases eg goes up and for decreases eg goes down															
	b	i A pattern in the results ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... other explanations ... <input checked="" type="checkbox"/> (1)	[2]																
		ii <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>likely</th> <th>not likely</th> </tr> </thead> <tbody> <tr> <td>The direction of the wind.</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>How close to the motorway the ...</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>Whether the sun is shining.</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>The number of cars passing by.</td> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>		likely	not likely	The direction of the wind.	✓		How close to the motorway the ...	✓		Whether the sun is shining.		✓	The number of cars passing by.	✓		[2]	four correct = 2 marks three or two correct = 1 mark one correct = 0 marks
	likely	not likely																	
The direction of the wind.	✓																		
How close to the motorway the ...	✓																		
Whether the sun is shining.		✓																	
The number of cars passing by.	✓																		
Total			[5]																

Question		Expected Answers	Marks	Additional Guidance
3	a	<p>The range of the results ...</p> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[1]	
	b	i sample 2 (1)	[1]	accept 11
		ii <p>The result is very different ...</p> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
	c	23 (1)	[1]	
	d	i <p>It forms strong bonds ...</p> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1)	[1]	

Question			Expected Answers	Marks	Additional Guidance
3	d	ii	<input type="checkbox"/> <input type="checkbox"/> It increases the length ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
			Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	<p>... make the material. <input checked="" type="checkbox"/></p> <p>... make bags from the material. <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>... disposing of the bags. <input checked="" type="checkbox"/></p>	[2]	all three correct = 2 marks two correct = 1 mark one correct = no marks
		ii	<p>Plastic decomposes very slowly. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Paper is attacked by bacteria ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[2]	
		iii	cheaper / stronger (1)	[1]	comparison required eg allow stronger not strong allow rip more easily
	b		landfill will take longer to fill up (1) less litter around the countryside (1) less harm to wildlife (1)	[3]	allow one answer relating to not using up so much crude oil
			Total	[8]	

Question		Expected Answers	Marks	Additional Guidance
5	a		[3]	all four correct = 3 marks three correct = 2 marks two correct = 1 mark one correct = 0 marks two lines to or from a box on the left means that neither of the two lines can be counted as correct
	b	i	a plan for meeting people's needs (1) without spoiling the environment for the future / leaving resources for the future (generations) (1)	[2] allow without using up finite resources allow replacing what we use so that it does not run out in the future for 2 marks allow examples in place of resources eg trees
		ii	any two from: organic farming uses natural fertilisers eg manure (that can be obtained from animals); organic farming uses natural predators (to kill pests); organic farming does not use up (finite) crude oil supplies;	[2] allow supply of animal manure will not run out ora intensive farming uses synthetic pesticides/ chemicals ora fossil fuels used to make eg synthetic fertiliser/chemicals will run out
Total			[7]	

Question		Expected Answers	Marks	Additional Guidance																															
6	a	<p style="text-align: right;"><input type="checkbox"/></p> <p style="text-align: right;">... a longer shelf life. <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;"><input type="checkbox"/></p>	[1]																																
	b	i	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"></td> <td style="width: 10%; text-align: center;">true</td> <td style="width: 10%; text-align: center;">false</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>... independent ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> </tr> <tr> <td>... watchdog.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>... funded by ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> <td></td> </tr> <tr> <td>... protects the public's health ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> </tr> <tr> <td>... an Act of Parliament.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td></td> </tr> </table>		true	false			... independent ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>			... watchdog.					... funded by ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>			... protects the public's health ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>			... an Act of Parliament.	<input checked="" type="checkbox"/>	<input type="checkbox"/>			[2]	all four correct = 2 marks three correct = 1 marks two correct or one correct = 0 marks
	true	false																																	
... independent ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																																	
... watchdog.																																			
... funded by ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																																	
... protects the public's health ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																																	
... an Act of Parliament.	<input checked="" type="checkbox"/>	<input type="checkbox"/>																																	
		ii	<p style="text-align: right;"><input type="checkbox"/></p> <p style="text-align: right;">...has passed a safety test. <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;">...approved for use in the EU. <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;"><input type="checkbox"/></p> <p style="text-align: right;"><input type="checkbox"/></p>	[2]																															

Question		Expected Answers	Marks	Additional Guidance
6	c	<div style="text-align: right; margin-right: 20px;"> <input type="checkbox"/> <input type="checkbox"/> ... lower than some food. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> ... maximum recommended dose ... <input checked="" type="checkbox"/> (1) </div>	[2]	
		Total	[7]	

A321/02 Modules C1, C2, C3 Higher Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	<p>... N₂ from air ... <input type="checkbox"/></p> <p>... O₂ from air ... <input checked="" type="checkbox"/> (1)</p> <p>... <input type="checkbox"/></p> <p>... <input type="checkbox"/></p> <p>... monoxide reacts with O₂ ... <input checked="" type="checkbox"/> (1)</p> <p>... <input type="checkbox"/></p>	[2]	
		ii	<p>any two from: nitrogen dioxide dissolves in water; reacts with oxygen; forms acid rain;</p> <p>plus effect of acid rain eg erodes buildings / kills fish / kills trees (1)</p>	[3]	<p>ignore references to global warming</p> <p>allow makes lakes acidic allow harms/damages trees/fish allow damages/corrodes buildings do not allow burns buildings ignore references to asthma etc</p>

Question			Expected Answers	Marks	Additional Guidance
1	a	iii	Carbon monoxide is converted ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> Nitrogen monoxide is decomposed ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[2]	
1	b		<input type="text"/> <input type="text" value="11"/> <input type="text"/> <input type="text" value="8"/>	[2]	
			Total	[9]	

Question		Expected Answers	Marks	Additional Guidance
2	a	as the number of vehicles increases the number of particulates increases / there is a <u>positive</u> correlation (between number of vehicles and particulate concentration) (1)	[1]	allow reverse answer – decreases and decreases allow alternatives for increases eg goes up and for decreases eg goes down
	b	<p>i</p> <p><input type="checkbox"/></p> <p>... report similar results ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p>... produces a smoky flame. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[2]	
		<p>ii</p> <p>... powered by electric motors. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>... removed from the flue ... <input checked="" type="checkbox"/> (1)</p>	[2]	
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
3	a	<p>... 26 kN is not in the range ... <input checked="" type="checkbox"/> (1)</p> <p>... 23 kN is not in the range ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	[2]	
	b	<p>so that the outcome is only affected by the factor being investigated / so that other factors do not change the results (1)</p> <p>because change in temperature/equipment could affect the results (1)</p>	[2]	<p>ignore references to fair testing / accuracy of results / reliability</p> <p>allow explanation of effect of temperature/equipment eg at higher temperature will be softer</p>
	c	i		
		<p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>... strong bonds ... <input checked="" type="checkbox"/> (1)</p>	[1]	

Question			Expected Answers	Marks	Additional Guidance
3	c	ii	<p>It increases the length ...</p> <p style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </p>	[1]	
Total				[6]	
4	a		<p>The energy used to make the material. <input checked="" type="checkbox"/></p> <p>The energy used to make bags. <input checked="" type="checkbox"/></p> <p style="text-align: center;"><input type="checkbox"/> <input type="checkbox"/></p> <p>... disposing of the bags. <input checked="" type="checkbox"/></p>	[2]	<p>all three correct = 2 marks two correct = 1 mark one correct = no marks</p>
	b		<p>any three from: people have become more aware of environmental issues / people are more aware that the plastic bags are not biodegradable (1) we produce more rubbish now (1) oil reserves are smaller now / material to make bags is running out (1) there is now not much space left for landfill (1)</p>	[3]	<p>ignore references to paper bags answers must refer to attitudes and fit a time line eg then and now ignore vague references to global warming / pollution / litter / biodegradability / scientific research about biodegradability allow a mark for carbon dioxide given off as fuel is burned to make plastic bags is now known to cause global warming</p>

Question		Expected Answers	Marks	Additional Guidance
4	c	<p>... used for longer ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p>There is less poly(ethene) ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p>... more likely to be dropped ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[3]	
		Total	[8]	
5	a	<p><input type="checkbox"/></p> <p>... population ... much larger ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>... produce higher yields ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[2]	

Question		Expected Answers				Marks	Additional Guidance
5	b	<input checked="" type="checkbox"/>	...more sustainable	but		[2]	
					...sufficient fertiliser.	<input checked="" type="checkbox"/>	
	c				<input type="checkbox"/>	[2]	
					<input type="checkbox"/>		
			... damage to the environment.	<input checked="" type="checkbox"/>	(1)		
			... toxic pesticide residues.	<input checked="" type="checkbox"/>	(1)		
				<input type="checkbox"/>			
				<input type="checkbox"/>			
		Total				[6]	

Question		Expected Answers	Marks	Additional Guidance	
6	a	<input type="checkbox"/> ... has passed a safety test. <input checked="" type="checkbox"/> (1) ... approved for use in the EU. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[2]		
	b	<input type="checkbox"/> <input type="checkbox"/> Soft drinks contain much lower ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> You would have to drink about ... <input checked="" type="checkbox"/> (1)	[2]		
	c	i	what is the chance/risk that they will be harmed by sodium benzoate (1) how serious would the harm caused by sodium benzoate be / what damage it may cause (1)	[2]	answers must be based on chance and consequence ignore risk and benefit answers allow the same ideas expressed with different wording allow what dosage would cause harm and how much is in the drinks and how much you drink (all three ideas for one mark) ignore vague references to effect on the body, amount in drinks or how much causes harm

Question			Expected Answers	Marks	Additional Guidance
6	c	ii	for actions where the risk is not known for certain / we do not know for certain if it is harmful (1) it is better to avoid the risk / it is better to avoid it until we do know (1)	[2]	allow one mark for 'it is better to be safe than sorry' if neither of the other two marking points have scored ignore 'don't want to take the risk' unless qualified ignore references to allergies ignore risk and benefit answers
			Total	[8]	

A322/01 Modules C4, C5, C6 Foundation Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	group and period (1)	[1]	
	b	2 and 20 (1)	[1]	allow 'alkali Earth metals' instead of 2
	c	i magnesium (1)	[1]	
		ii carbon (1)	[1]	
		Total	[4]	
2	a	any two from: properties show a trend/pattern / example of pattern eg melting point/density changes as go down group (1) melting point is between sodium and rubidium / melting point between 39°C and 98°C (1) density is between sodium and rubidium / density between 1.53 g/cm ³ and 0.97 g/cm ³ (1)	[2]	ignore references to atomic number /reactivity allow value between 39°C and 98°C; allow value between 1.53 g/cm ³ and 0.97 g/cm ³
	b	down the group melting point decreases (1) down the group density increases (1)	[2]	allow 'as atomic number rises' as alternative to 'down the group' in either marking point ignore references to atomic number / reactivity allow one mark for 'melting point decreases and density increases' without reference to 'down the group'
	c	electrons (1) protons and neutrons (1)	[2]	must be in correct order
		Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	<input type="checkbox"/> <input type="checkbox"/> ... both oxidation and reduction. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
		ii	copper (1) zinc (1)	[2]	
	b		<input type="checkbox"/> <input type="checkbox"/> Lithium is very reactive. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
	c		melts (1) ions (1) negative and positive (1)	[3]	
			Total	[7]	
4			nitrogen (1) 7 (1) 8 (1)	[3]	do not allow symbol
			Total	[3]	

Question		Expected Answers	Marks	Additional Guidance															
5	a	<table border="0"> <tr> <td>name of gas</td> <td>element</td> <td>compound</td> </tr> <tr> <td>carbon dioxide</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>nitrogen</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>argon</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>oxygen</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	name of gas	element	compound	carbon dioxide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	nitrogen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	argon	<input checked="" type="checkbox"/>	<input type="checkbox"/>	oxygen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	all four correct = 2 marks 2 or 3 correct = 1 mark
name of gas	element	compound																	
carbon dioxide	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
nitrogen	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
argon	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
oxygen	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
	b	<p>similarities any two from: both contain carbon dioxide; both contain nitrogen; both contain argon; both contain oxygen; both contain only small/similar amount argon;</p> <p>differences (2) any two from: Mars has higher % carbon dioxide; Earth has higher % nitrogen; Earth has higher % oxygen; Mars has higher % argon;</p>	[4]	<p>for four marks should have two 'similarity' marks and two 'difference' marks</p> <p>'both contain all four gases/same gases' = 2 marks allow both contain more nitrogen than oxygen</p> <p>ignore 'levels are different' for named gases ignore unqualified numerical comparisons</p>															
	c	other gas/gases are in Mars atmosphere (1)	[1]	accept measurements may not be accurate allow unknown gas/element present															
Total			[7]																

Question			Expected Answers	Marks	Additional Guidance
6	a	i	90–120 (s) (1)	[1]	accept answers in range
		ii	<div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> All the acid has been used up. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div>	[1]	
	b	i	carbon dioxide (1)	[1]	
		ii	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">chemical</div> <div style="border: 1px solid black; padding: 5px; margin-left: 10px;">(s)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">calcium carbonate</div> <div style="border: 1px solid black; padding: 5px; margin-left: 10px;">(g)</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">gas made in the reaction</div> <div style="border: 1px solid black; padding: 5px; margin-left: 10px;">(aq)</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">calcium chloride solution</div> <div style="border: 1px solid black; padding: 5px; margin-left: 10px;">(l)</div> </div> </div>	[2]	all four correct = 2 marks two or three correct = 1 mark one correct = 0 marks

Question			Expected Answers	Marks	Additional Guidance
6	b	iii		[2]	all four lines correct = 2 marks two or three lines correct = 1 mark one line correct = 0 marks
			Total	[7]	
7	a	40 } 16 } (1) 1 }	[2]	ignore units if given	
		111 (1)		if 20 is given for RAM of Ca allow a mark for 91	
	b	OH ⁻ (1)	[1]		
	c		[1]	H ⁺ and OH ⁻ can be written in either order in the two boxes on the left of the arrow	
		Total	[4]		
8	a	falls/gets less (1)	[2]	no mark for 'evaporation' unqualified / solution evaporates	
		water is lost / water evaporates (1)			
	b	to dry out / make sure (all) water has gone (1)	[1]	allow to evaporate remaining water / get rid of the water do not allow to dry the solution	
		c	4.2 (1)	[1]	
		Total	[4]		

A322/02 Modules C4, C5, C6 Higher Tier

Question		Expected Answers		Marks	Additional Guidance																		
1			<table border="0"> <tr> <td></td> <td>true</td> <td>false</td> </tr> <tr> <td>Magnesium and ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>All of the elements ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Two of the elements ...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>One of the elements ...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Carbon has ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>		true	false	Magnesium and ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	All of the elements ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Two of the elements ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	One of the elements ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Carbon has ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2]	all five correct = 2 marks three or four correct = 1 mark two or one correct = 0 marks
	true	false																					
Magnesium and ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																					
All of the elements ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																					
Two of the elements ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
One of the elements ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
Carbon has ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																					
		Total		[2]																			

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>any two from: properties show a trend/pattern / example of pattern eg melting point/density changes as go down group (1) melting point is between sodium and rubidium / melting point between 39°C and 98°C (1) density is between sodium and rubidium / density between 1.53 g/cm³ and 0.97 g/cm³ (1)</p>	[2]	<p>ignore references to atomic number / reactivity</p> <p>allow value between 39°C and 98°C;</p> <p>allow value between 1.53 g/cm³ and 0.97 g/cm³</p>
	b	<p>down the group melting point decreases (1) down the group density increases (1)</p>	[2]	<p>allow 'as atomic number rises' as alternative to 'down the group' in either marking point ignore references to atomic number / reactivity allow one mark for 'melting point decreases and density increases' without reference to 'down the group'</p>
	c	i	[1]	allow phonetic spelling but not <u>lithium chlorine</u>
		ii	[1]	<p>numbers in front of Li and LiCl must be large number 2 in Cl₂ must be small do not allow any additional numbers</p> <p>'l' in Cl and 'i' in Li must be lower case do not allow CL or LI ignore state symbols e.g. (s) (aq) (g) or (l) after the formulae</p>
			[6]	
		Total		

Question		Expected Answers	Marks	Additional Guidance
3	a	correct symbols of elements N H O and S (1) correct numbers NO ₂ SH ₇ (1)	[2]	any order symbols must be capitals not h or n numbers in formula must be subscripts subscripts must be shown for correct element ie O ₂ and H ₇ allow 1 mark if only N or S is missed out of fully correct formula ie for O ₂ SH ₇ or NO ₂ H ₇
	b	<div style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> Hydrogen atoms are much lighter ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div>	[1]	
Total			[3]	

Question		Expected Answers	Marks	Additional Guidance	
4	a	<input type="checkbox"/> When heated, ionic compounds melt. <input checked="" type="checkbox"/> (1) Ions in molten compounds can move. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[2]		
	b	purple grey solid } either order	[2]	all three correct = 2 marks two correct = 1 mark one correct = 0 marks	
	c	i	K ⁺ (1)	[1]	
		ii	CuBr ₂ (1)	[1]	do not allow Cu ₂ Br or CuBR ₂ do not allow any charges shown eg Cu ²⁺ Br ₂ ⁻ ignore 'working out' before the formula
Total				[6]	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	<p>The reaction involves both ...</p> <p style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </p>	[1]	
		ii	copper (1) zinc (1)	[2]	
	b	i	<p>Lithium is very reactive.</p> <p style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </p>	[1]	
		ii	e ⁻ (1) 2e ⁻ (1)	[2]	allow e for e ⁻ do not allow e ²⁻ or 'electron' in words
	c	i	positive ions / cations (1) surrounded by electrons / in a sea of electrons / delocalised electrons (1)	[2]	do not allow positive nucleus allow 'free' or 'moving' electrons max (1) mark if ionic or covalent bonding mentioned
		ii	electrons <u>move</u> (1)	[1]	ignore 'electrons carry the charge'
Total				[9]	

Question		Expected Answers	Marks	Additional Guidance
6	a	rate slows / reaction slows / less gas given off per unit time (1) reaction stops / no more gas given off (1) acid is used up / acid is neutralised / <u>lower surface area</u> of limestone / fewer collisions (1)	[3]	ignore 'less gas given off' ignore 'limestone used up'
	b	faster reaction / gas given off more quickly / reaction takes less time (1) more gas given off (1)	[2]	
		Total	[5]	

Question		Expected Answers	Marks	Additional Guidance																	
7	a	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 10%; text-align: center;">true</td> <td style="width: 10%; text-align: center;">false</td> <td style="width: 50%;"></td> </tr> <tr> <td>The mixture has a high pH ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td rowspan="4" style="vertical-align: top;"> [2] all four correct = 2 marks two or three correct = 1 mark one correct = 0 marks </td> </tr> <tr> <td>The pH stays constant ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Hydrogen is made ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Water is made ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		true	false		The mixture has a high pH ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2] all four correct = 2 marks two or three correct = 1 mark one correct = 0 marks	The pH stays constant ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hydrogen is made ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water is made ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
	true	false																			
The mixture has a high pH ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2] all four correct = 2 marks two or three correct = 1 mark one correct = 0 marks																		
The pH stays constant ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																			
Hydrogen is made ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																			
Water is made ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																			
	b	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">D</td> <td style="padding: 5px;">C</td> <td style="padding: 5px;">B</td> <td style="padding: 5px;">A</td> </tr> </table>	D	C	B	A	[2]	leaves out E = 1 mark fully correct = 2 marks													
D	C	B	A																		
	c	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 5px;">40</td> <td rowspan="3" style="font-size: 2em; vertical-align: middle;">}</td> <td rowspan="3" style="padding-left: 5px;">(1)</td> </tr> <tr> <td style="padding-right: 5px;">16</td> </tr> <tr> <td style="padding-right: 5px;">1</td> </tr> <tr> <td colspan="3" style="padding-top: 5px;">111 (1)</td> </tr> </table>	40	}	(1)	16	1	111 (1)			[2]	ignore units if given if 20 is given for RAM of Ca allow a mark for 91									
40	}	(1)																			
16																					
1																					
111 (1)																					
		ii	OH ⁻ (1)	[1]																	
		iii	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">H⁺</td> <td style="padding: 0 10px;">+</td> <td style="padding: 5px;">OH⁻</td> <td style="padding: 0 10px;">→</td> <td style="padding: 5px;">H₂O</td> </tr> </table>	H ⁺	+	OH ⁻	→	H ₂ O	[1]	H ⁺ and OH ⁻ can be written in either order in the two boxes on the left of the arrow											
H ⁺	+	OH ⁻	→	H ₂ O																	
			Total	[8]																	

Question		Expected Answers	Marks	Additional Guidance
8	a	zinc metal <input checked="" type="checkbox"/> (1) <input type="checkbox"/> zinc carbonate <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[2]	
	b	zinc metal (1)	[1]	
		Total	[3]	

Grade Thresholds

General Certificate of Secondary Education
GCSE Twenty First Century Chemistry A (J634)
January 2010 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A321/01	Raw	42				22	18	14	10	6	0
	UMS	34				30	25	20	15	10	0
A321/02	Raw	42	28	23	19	15	10	7			0
	UMS	50	45	40	35	30	25	20			0
A322/01	Raw	42				23	19	15	12	9	0
	UMS	34				30	25	20	15	10	0
A322/02	Raw	42	31	24	18	12	8	6			0
	UMS	50	45	40	35	30	25	20			0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J634	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J634	0.0	50.0	50.0	50.0	100.0	100.0	100.0	100.0	100.0	2

88 candidates were entered for aggregation this series.

For a description of how UMS marks are calculated see:

<http://www.ocr.org.uk/learners/ums/index.html>

Statistics are correct at the time of publication.

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