

GCSE

Chemistry A

Session: 2010 June
Type: Mark scheme
Code: J634
Units: A321; A322; A323

Chemistry A

General Certificate of Secondary Education **A321/01**

Unit 1: Modules C1, C2, C3 (Foundation Tier)

Mark Scheme for June 2010

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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
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

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. 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.

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.

<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, 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.

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, 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		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Expected Answers	Marks	Additional Guidance
1	a	i	gases breathed out by animals <input type="checkbox"/> the burning of fuels ... <input checked="" type="checkbox"/> (1) the spreading of fertiliser ... <input type="checkbox"/>	[1]	
		ii	oxygen (1) water (1)	[2]	
		iii	nitrogen dioxide (1) NO ₂ (1)	[2]	
	b		There was a decrease ... <input type="checkbox"/> More cars and power stations ... <input checked="" type="checkbox"/> (1) There was an increase ... <input type="checkbox"/> More cars were fitted ... <input type="checkbox"/> More power stations were fitted ... <input checked="" type="checkbox"/> (1) More people changed ... <input type="checkbox"/>	[2]	
	c		people living near ... <input type="checkbox"/> people working in ... <input type="checkbox"/> the Government ... <input checked="" type="checkbox"/> (1) the companies supplying ... <input type="checkbox"/>	[1]	
Total				[8]	

Question			Expected Answers	Marks	Additional Guidance																				
2	a	i	any two from: it enables an average/mean to be calculated; it allows outliers to be identified (and discarded); it allows for differences in samples / it allows for errors in equipment / it allows for errors in technique / one measurement may be in error;	[2]	do not allow it increases the reliability/accuracy of the results allow it increases the reliability/accuracy of the best estimate																				
		ii	0.168 (2)	[2]	2 marks for correct answer allow 1 mark for addition of values to 0.84																				
	b		<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: right;">(1)</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">(1)</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	(1)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	(1)	<input type="checkbox"/>		<input type="checkbox"/>		[2]	
<input type="checkbox"/>		<input type="checkbox"/>																							
<input checked="" type="checkbox"/>		<input type="checkbox"/>	(1)																						
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<input type="checkbox"/>		<input checked="" type="checkbox"/>	(1)																						
<input type="checkbox"/>		<input type="checkbox"/>																							
			Total	[6]																					

Question			Expected Answers	Marks	Additional Guidance
3	a	i	135 (1)	[1]	
		ii	134 to 137 (1)	[1]	allow 137 to 134 but do not allow 3 or 4
		iii	B higher than A <input type="checkbox"/> ... same value as the mean. <input type="checkbox"/> The mean near to the middle ... <input type="checkbox"/> ... narrow range. <input checked="" type="checkbox"/> (1)	[1]	
		iv	... many errors ... <input type="checkbox"/> ... small variations in structure. <input checked="" type="checkbox"/> (1) ... different melting points. <input type="checkbox"/>	[1]	
	b	i	it has a lower melting point (1) and any one from: which will allow easier moulding; reduces energy needed/cost of heating; idea of increased productivity/time saving;	[2]	first mark requires comparison
		ii		[2]	all three correct = 2 marks two correct = 1 mark two lines to or from one box negates that box from score
Total				[8]	

Question		Expected Answers	Marks	Additional Guidance
4	a	valid choice of article (no marks) material this article used to be made from (1) material this article is now made from (1) valid advantage of new material (1)	[3]	if article choice is not valid = 0 marks reject any mention of shoes advantage mark can only be scored if two different old and new materials valid for the article named are given
	b	... renewable ... <input checked="" type="checkbox"/> ... more attractive appearance ... <input type="checkbox"/> ... more expensive ... <input type="checkbox"/> ... will rot ... <input checked="" type="checkbox"/> ... uses more energy ... <input checked="" type="checkbox"/> ... used for longer ... <input type="checkbox"/>	[2]	three correct answers = 2 marks two correct answers = 1 mark
	c	... chemicals from crude oil. <input type="checkbox"/> ... animal skins. <input type="checkbox"/> ... obtained without spoiling ... <input checked="" type="checkbox"/> (1) ... hard wearing ... <input type="checkbox"/>	[1]	
Total			[6]	

Question		Expected Answers			Marks	Additional Guidance
5	a				[2]	three ticks in boxes as shown all three correct = 2 marks two correct = 1 mark
		statement	type 1 diabetes	type 2 diabetes		
		...diet and exercise	✓			
		...young people		✓		
		...its own insulin		✓		
	b	i	... contains a lot of sugar.	<input checked="" type="checkbox"/> (1)	[2]	
		... contains a lot of fat.	<input type="checkbox"/>			
		Fat digested into sugar.	<input type="checkbox"/>			
		Sugar is quickly absorbed...	<input checked="" type="checkbox"/> (1)			
		ii	any two from: (they believe) it is cheaper to eat a poor diet; they do not have enough knowledge about food to make a more sensible choice; they do not realise that they have a higher risk; comfort eating / better taste / habit;		[2]	accept arguments based around 'no choice'
		Total			[6]	

Question		Expected Answers	Marks	Additional Guidance
6	a	amino acids (1) proteins (1)	[2]	
	b	plant legumes/beans/peas/clover / crop rotation (1) because bacteria in their roots fix nitrogen / because one crop puts back the nitrogen taken out by others (1)	[2]	do not allow idea of adding compost /dead plants/ dead animals/sewage to soil do not allow small scale ideas that apply to gardening but not farming
	c	i any three (including at least one 'pests' answer and at least one 'weeds' answer) from: 'pests' idea of using natural predators of insect pests; pick off insects by hand; grow insect repelling plants amongst crops; use protective measures eg scarecrows, netting or bird scares; 'weeds' pull out weeds by hand; plant crops with little space between to deter weeds; use mulch on surface of soil to deter weeds;	[3]	at least one pests answer at least one weeds answer other answer can be either all pests answer /all weeds answer = max 2 marks
		ii idea of not using harmful chemicals (1)	[1]	
		Total	[8]	

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Chemistry A

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Unit 1: Modules C1, C2, C3 (Higher Tier)

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the two correct
boxes.

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E.g. If a question requires candidates to identify a city in England, then in the boxes

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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		Expected Answers	Marks	Additional Guidance					
1	a	<p>There was a decrease ... <input type="checkbox"/></p> <p>More cars and power stations ... <input checked="" type="checkbox"/> (1)</p> <p>There was an increase ... <input type="checkbox"/></p> <p>More cars were fitted ... <input type="checkbox"/></p> <p>More power stations were fitted ... <input checked="" type="checkbox"/> (1)</p> <p>More people changed ... <input type="checkbox"/></p>	[2]						
	b	<p>as fuel burns it forms sulfur dioxide (1)</p> <p>sulfur dioxide reacts with oxygen (1)</p> <p>and water (in the air) (1)</p>	[3]	<p>do not allow answers based on formation of carbon dioxide or nitrogen oxides</p> <p>do not allow sulfur is released into air and then reacts with oxygen forming sulfur dioxide for the first mark</p> <p>do not allow sulfur dioxide reacting with/dissolving in rain</p> <p>allow water vapour or moisture for water</p>					
	c	<p>B and D not included in answer (1)</p> <p><table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>A</td> <td>F</td> <td>G</td> <td>C</td> <td>E</td> </tr> </table> (2)</p>	A	F	G	C	E	[3]	<p>allow one mark for FBCE</p> <p>allow one mark for three consecutive letters in correct order ie FGC or GCE even if other letter is B or D</p>
A	F	G	C	E					
Total			[8]						

Question			Expected Answers	Marks	Additional Guidance															
2	a	i	<p>any two from:</p> <p>it enables an average/mean to be calculated;</p> <p>it allows outliers to be identified (and discarded);</p> <p>it allows for differences in samples / it allows for errors in equipment / it allows for errors in technique / one measurement may be in error;</p>	[2]	<p>do not allow it increases the reliability/accuracy of the results</p> <p>allow it increases the reliability/accuracy of the best estimate</p>															
		ii	0.168 (2)	[2]	<p>2 marks for correct answer</p> <p>allow 1 mark for 0.174</p>															
	b		<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/> (1)</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input checked="" type="checkbox"/> (1)</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/> (1)	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/> (1)	<input type="checkbox"/>		<input type="checkbox"/>	[2]	
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			Total	[6]																

Question		Expected Answers	Marks	Additional Guidance
3	a	<p>the only factor that is varied must be the one being investigated / only polymer type must be varied / so that the different polymer types can be compared (1)</p> <p>other factors than the one being investigated can affect the results / to make sure no other factors affect the outcome / using different equipment might produce different results / the results would vary with sample size (1)</p>	[2]	<p>ignore references to fair test or fair testing or bias</p> <p>ignore reference to making errors</p> <p>ignore references to getting different results each time unless qualified</p> <p>ignore references to accuracy or reliability</p>
	b	<p>i</p> <p>... between the atoms ... <input type="checkbox"/></p> <p>... between the molecules ... <input checked="" type="checkbox"/> (1)</p> <p>... bonded in different ways. <input type="checkbox"/></p> <p>Some atoms stronger forces ... <input type="checkbox"/></p> <p>... higher the forcemore energy ... <input checked="" type="checkbox"/> (1)</p>	[2]	
		<p>ii</p> <p>increasing chain length (1)</p> <p>increasing crystallinity (1)</p>	[2]	<p>each answer must refer to an increase to get the mark</p> <p>allow increase density as an alternative to crystallinity</p> <p>allow add cross-links / increase cross-linking</p> <p>do not allow cross links without idea of adding or increasing</p> <p>allow decrease branching</p> <p>do not allow make polymer branched / increase branching</p> <p>do not allow removal of plasticizer</p> <p>do not allow vulcanisation</p>
		Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	<p>... renewable ... <input checked="" type="checkbox"/></p> <p>... more attractive appearance ... <input type="checkbox"/></p> <p>... more expensive ... <input type="checkbox"/></p> <p>... will rot ... <input checked="" type="checkbox"/></p> <p>... uses more energy ... <input checked="" type="checkbox"/></p> <p>... used for longer ... <input type="checkbox"/></p>	[2]	three correct answers = 2 marks two correct answers = 1 mark
		ii	<p>Plastics have to be imported ... <input checked="" type="checkbox"/> (1)</p> <p>It is easier ... <input type="checkbox"/></p> <p>Leather is more durable ... <input type="checkbox"/></p> <p>Leather can be made locally ... <input checked="" type="checkbox"/> (1)</p> <p>Plastic shoes are not suitable ... <input type="checkbox"/></p>	[2]	

Question		Expected Answers	Marks	Additional Guidance
4	b	<p>... last a lot longer ... <input checked="" type="checkbox"/> (1)</p> <p>Manufacturing energy. <input checked="" type="checkbox"/> (1)</p> <p>... different small molecule ... <input type="checkbox"/></p> <p>... uses chemicals ... <input checked="" type="checkbox"/> (1)</p> <p>... will rot ... <input type="checkbox"/></p> <p>Making takes more energy ... <input type="checkbox"/></p>	[3]	
		Total	[7]	

Question			Expected Answers	Marks	Additional Guidance												
5	a	i	<table border="1"> <thead> <tr> <th>statement</th> <th>type 1 diabetes</th> <th>type 2 diabetes</th> </tr> </thead> <tbody> <tr> <td>...diet and exercise</td> <td>✓</td> <td></td> </tr> <tr> <td>...young people</td> <td></td> <td>✓</td> </tr> <tr> <td>...its own insulin</td> <td></td> <td>✓</td> </tr> </tbody> </table>	statement	type 1 diabetes	type 2 diabetes	...diet and exercise	✓		...young people		✓	...its own insulin		✓	[2]	three ticks in boxes as shown all three correct = 2 marks two correct = 1 mark
		statement	type 1 diabetes	type 2 diabetes													
...diet and exercise	✓																
...young people		✓															
...its own insulin		✓															
		ii	<p>Only a few food items ... <input type="checkbox"/></p> <p>... high blood sugar level. <input checked="" type="checkbox"/> (1)</p> <p>Avoiding ... <input type="checkbox"/></p> <p>Both types of diabetes ... <input type="checkbox"/></p> <p>... serious symptoms. <input checked="" type="checkbox"/> (1)</p> <p>... liver stores the excess sugar. <input type="checkbox"/></p>	[2]													
	b		<p>Jason <input checked="" type="checkbox"/> (1)</p> <p>Rosie <input type="checkbox"/></p> <p>Steve <input type="checkbox"/></p> <p>Emma <input checked="" type="checkbox"/> (1)</p>	[2]													
			Total	[6]													

Question		Expected Answers	Marks	Additional Guidance
6	a	amino acids (1) proteins/polypeptides (1)	[2]	do not allow monomers allow singulars instead of plurals
	b	<p>Lightning ... <input checked="" type="checkbox"/> (1)</p> <p>Plants absorb nitrogen gas ... <input type="checkbox"/></p> <p>Ammonia is made ... <input type="checkbox"/></p> <p>Nitrogen oxides dissolve ... <input checked="" type="checkbox"/> (1)</p> <p>Ammonia is used ... <input type="checkbox"/></p> <p>Plants use nitrogen gas ... <input type="checkbox"/></p>	[2]	
	c	plant legumes/beans/peas/clover / crop rotation (1) because nodules/bacteria in their roots fix nitrogen / because one crop puts back the nitrogen taken out by others (1)	[2]	do not allow idea of adding compost/dead plants/dead animals/sewage to soil do not allow small scale ideas that apply to gardening but not farming
	d	synthetic fertiliser is too expensive for farmers in developing countries to buy / manure is free for farmers in developing countries (1) developing countries do not have the technology to make fertiliser / developing countries have to import synthetic fertiliser / manure is readily available in developing countries (1) there is not enough manure in the UK to provide all of the fertiliser that farmers need / synthetic fertilisers are used in UK to produce high yields (1)	[3]	ignore references to organic farming and its supposed advantages
		Total	[9]	

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14 – 19 Qualifications (General)

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Chemistry A

General Certificate of Secondary Education **A322/01**

Unit 2: Modules C4, C5, C6

Mark Scheme for June 2010

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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Question		Expected Answers	Marks	Additional Guidance
1	a	dark grey to orange <input type="checkbox"/> orange to yellow <input type="checkbox"/> dark grey to purple <input checked="" type="checkbox"/> (1) green to brown <input type="checkbox"/>	[1]	
	b	I_2 (1) (g) (1)	[2]	not (gas) or (G)
	c	i* KF (1)	[1]	accept FK
		ii* <ul style="list-style-type: none"> melting point rises / becomes less negative (1) boiling point rises (1) reactivity decreases (down the group) (1) 	[3]	ignore references to atomic number or mass number
	d	non-metal bigger less	[2]	all three correct = 2 marks one or two correct = 1 mark
		Total	[9]	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>It starts to fizz. <input type="checkbox"/></p> <p>It expands. <input type="checkbox"/></p> <p>It catches fire. <input type="checkbox"/></p> <p>It goes from shiny to dull. <input checked="" type="checkbox"/> (1)</p>	[1]	
	b	4 (1)	[1]	accept four
	c	<p>...more electrons than protons. <input type="checkbox"/></p> <p>...lower mass than a lithium atom. <input type="checkbox"/></p> <p>...more protons than neutrons. <input type="checkbox"/></p> <p>...ion by losing one electron <input checked="" type="checkbox"/> (1)</p>	[1]	
	d	i	[1]	ignore 'Different lines' ignore just "spectra is different/ different lengths/ different size sections" accept "lines do not match up"
		ii	[1]	need both for 1 mark accept correct symbols i.e. Na and K
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
3	a	<p>The ions become free to move. <input checked="" type="checkbox"/> (1)</p> <p>The ions spread very far apart. <input type="checkbox"/></p> <p>New bonds form between the ions. <input type="checkbox"/></p> <p>The arrangement of ions... <input checked="" type="checkbox"/> (1)</p> <p>...a regular arrangement. <input type="checkbox"/></p>	[2]	
	b	i	[1]	<p>accept arrows that are not horizontal, but are pointing towards the correct electrode</p> <p>any arrow in the wrong direction = 0</p> <p>accept arrows above and below the container but between the electrodes in the correct direction</p>
		ii	[1]	accept carbon dioxide/CO ₂
	c	<p>...good conductor of heat. <input type="checkbox"/></p> <p>...less dense than other metals. <input checked="" type="checkbox"/> (1)</p> <p>...lower melting point... <input type="checkbox"/></p> <p>...good electrical conductor. <input checked="" type="checkbox"/> (1)</p> <p>...softer... <input type="checkbox"/></p>	[2]	
	d	metallic (1)	[1]	
Total			[7]	

Question		Expected Answers	Marks	Additional Guidance
4*	a	SiO ₂ (1) Al ₂ O ₃ (1)	[2]	
	b	...less chlorine than sodium... <input checked="" type="checkbox"/> (1) Chlorine is a gas. <input type="checkbox"/> ...occurs in other compounds... <input checked="" type="checkbox"/> (1) ...shows only metals. <input type="checkbox"/> ...small amount of chlorine... <input type="checkbox"/>	[2]	
Total			[4]	

5	a	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>increases</th> <th>same</th> <th>decreases</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> <tr> <td>oxygen</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>		increases	same	decreases	carbon dioxide	✓			oxygen			✓	[1]	
		increases	same	decreases												
carbon dioxide	✓															
oxygen			✓													
b	carbon dioxide contains two elements / two types of atom / carbon and oxygen (1) Oxygen contains only one element / only one type of atom / only oxygen <u>atoms</u> (1)	[2]	assume "it" refers to carbon dioxide ignore "it is a mix of carbon and oxygen" allow "carbon dioxide has more / different elements" or "carbon dioxide has more than one element" not just "pure element" for oxygen not "2 oxygen molecules"													
Total			[3]													

Question		Expected Answers	Marks	Additional Guidance		
6	a*	7 1	[1]	both correct for 1 mark must be in correct order		
	b*	calcium nitrate (1) carbon dioxide and CO ₂ (1) water and H ₂ O (1)	[3]	reject carbon monoxide accept hydrogen oxide numbers in formulae must be smaller than letters. e.g. accept CO ₂ or CO ₂ / H ₂ O or H ₂ O reject CO ₂ or CO ² / H ₂ O or H ² O maximum (2) marks If extra numbers are written in front of formulae e.g. 2CO ₂ etc		
	c	i		lower concentration (of acid) (1) lumps of calcium carbonate (1) lower temperature (1)	[3]	allow “weaker concentration” not just “pieces of calcium carbonate” allow “less heat”
		ii		gas/carbon dioxide given off (1)	[1]	not “steam” ignore “evaporates/ the liquid turns to gas” not “CaCO ₃ turns to a gas” but accept “CaCO ₃ produces a gas”
				Total	[8]	

Question		Expected Answers	Marks	Additional Guidance				
7	a	bubbles (of gas) given off / fizzing (1) magnesium will dissolve / disappear/ get smaller (1)	[2]	ignore just "gas given off" ignore "smoke" ignore "change of colour"				
	b	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>C</td> <td>D</td> <td>B</td> <td>A</td> </tr> </table> (1)	C	D	B	A	[1]	fully correct order = 1 mark
C	D	B	A					
	c	80% (1)	[1]					
	d	use more acid <input checked="" type="checkbox"/> (1) heat the reaction... <input type="checkbox"/> use smaller pieces... <input type="checkbox"/> use a catalyst <input type="checkbox"/> use more magnesium <input checked="" type="checkbox"/> (1) ...for a longer time <input type="checkbox"/>	[2]					
Total			[6]					

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Chemistry A

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Unit 2: Modules C4, C5, C6

Mark Scheme for June 2010

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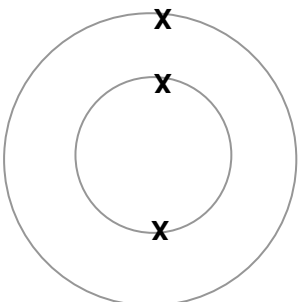
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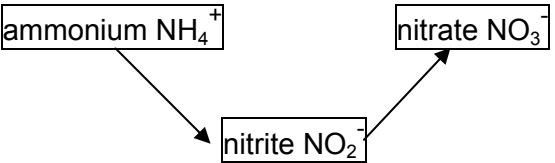
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Question		Expected Answers	Marks	Additional Guidance																		
1	a	FROM <u>dark grey</u> TO <u>purple</u> (1)	[1]	both colours required for 1 mark Order must be clear.																		
	b	I ₂ (aq) (1)	[1]	both required for 1 mark reject (ag)																		
	c	i* KF (1)	[1]	accept FK																		
		ii* melting point rises / becomes less negative (1) boiling point rises (1) reactivity decreases (down the group) (1)	[3]	ignore references to atomic number or mass number																		
	d	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>...is a gas.</td> <td></td> <td>✓</td> </tr> <tr> <td>...has a lower melting point...</td> <td></td> <td>✓</td> </tr> <tr> <td>...has one electron...</td> <td></td> <td>✓</td> </tr> <tr> <td>...forms an ion...</td> <td>✓</td> <td></td> </tr> <tr> <td>...reacts with iron more slowly...</td> <td>✓</td> <td></td> </tr> </tbody> </table>		true	false	...is a gas.		✓	...has a lower melting point...		✓	...has one electron...		✓	...forms an ion...	✓		...reacts with iron more slowly...	✓		[3]	all five correct = 3 marks four correct = 2 marks two or three correct = 1 mark one or none correct = 0 marks
	true	false																				
...is a gas.		✓																				
...has a lower melting point...		✓																				
...has one electron...		✓																				
...forms an ion...	✓																					
...reacts with iron more slowly...	✓																					
		Total	[9]																			

Question			Expected Answers	Marks	Additional Guidance																		
2	a	i	<table border="1"> <thead> <tr> <th>particle</th> <th>name of particle</th> <th>charge</th> </tr> </thead> <tbody> <tr> <td>●</td> <td>neutron</td> <td>0</td> </tr> <tr> <td>○</td> <td>proton</td> <td>+1</td> </tr> </tbody> </table> } (1) <table border="1"> <thead> <tr> <th>relative mass</th> </tr> </thead> <tbody> <tr> <td>1</td> </tr> <tr> <td>1</td> </tr> </tbody> </table> } (1)	particle	name of particle	charge	●	neutron	0	○	proton	+1	relative mass	1	1	[2]	charge on proton must have + sign accept 'neutral/none/no charge' for charge on neutron and 'positive' for charge on proton. accept +1 for relative mass but reject -1						
particle	name of particle	charge																					
●	neutron	0																					
○	proton	+1																					
relative mass																							
1																							
1																							
		ii	3 electrons showing configuration 2,1 (1) 	[1]	2 X's anywhere in first shell, 1 X anywhere in second shell accept any other symbols for electrons e.g. e or o																		
	b		<table border="0"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>...larger relative mass...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>...total charge...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>...more protons and electrons...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>...by gaining one electron.</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>...shells of electrons...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>		true	false	...larger relative mass...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...total charge...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	...more protons and electrons...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...by gaining one electron.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...shells of electrons...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	all five correct = 2 marks four correct = 1 mark three or less correct = 0 marks
	true	false																					
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...shells of electrons...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
Total				[5]																			

Question		Expected Answers	Marks	Additional Guidance
3	a	(oxide ions / negative ions) move to <u>positive</u> electrode / move to the <u>anode</u> (1) and then... lose electrons / form oxygen molecules / form oxygen gas / form O ₂ (1)	[2]	ignore references to movement of metal ions / aluminium ions; allow attracted to... for 'move' accept 'form oxygen' alone ignore 'form oxygen <u>atoms</u> ' ignore 'forms a gas' alone
	b	i	108 tonnes (1)	[1]
		ii	...ions give up electrons... <input type="checkbox"/> More atoms of aluminium... <input type="checkbox"/> ...same total number of electrons... <input checked="" type="checkbox"/> (1) Aluminium...positive electrode. <input type="checkbox"/>	[1]
Total				[4]

Question		Expected Answers	Marks	Additional Guidance
4*	a	SiO ₂ (1) Al ₂ O ₃ (1)	[2]	
	b	...less chlorine than sodium... <input checked="" type="checkbox"/> (1) Chlorine is a gas. <input type="checkbox"/> ...occurs in other compounds... <input checked="" type="checkbox"/> (1) ...shows only metals. <input type="checkbox"/> ...small amount of chlorine... <input type="checkbox"/>	[2]	
Total			[4]	

Question	Expected Answers	Marks	Additional Guidance
5 a	 <p>Fully correct = (2)</p> <p>(1) mark for either...</p> <p>All three names correct in correct places; All three formulae correct in correct places; Any 2 boxes fully correct;</p>	[2]	<p>ignore extra words in boxes unless more than one name or formula of a substance is given.</p>
b i	<p>higher <u>percentage</u> mass of C / ORA (1)</p> <p>lower number of carbon <u>atoms</u> / more hydrogen <u>atoms</u> / 3 carbon <u>atoms</u> and 7 hydrogen <u>atoms</u> (1)</p> <p>hydrogen has a lower <u>atomic</u> mass / hydrogen <u>atoms</u> are lighter / carbon has a mass of 12 and hydrogen has a mass of 1 (1)</p>	[3]	<p>ignore 'has 40% mass of carbon and/or 8% hydrogen'</p> <p>accept 'higher mass of carbon in the compound' or 'in the molecule'</p> <p>ignore 'higher mass of carbon' alone</p> <p>ignore 'There are <u>only</u> 3 carbon atoms'; If number of atoms are given, they must be correct.</p> <p>accept reverse arguments If atomic masses of atoms are given, they must be correct.</p>

Question			Expected Answers	Marks	Additional Guidance
5	b	ii	Alanine has a low melting point. <input type="checkbox"/> Alanine is soluble in water. <input type="checkbox"/> ...carbon, hydrogen and oxygen. <input checked="" type="checkbox"/> (1) Alanine is non-toxic. <input type="checkbox"/>	[1]	
			Total	[6]	

Question		Expected Answers	Marks	Additional Guidance
6	a	rate is faster (1) particles are closer together / more particles in the same volume (1) more <u>frequent</u> collisions / more collisions per unit time (1)	[3]	ignore Energy arguments / activation energy arguments; allow <u>faster</u> collisions/ more successful collisions
	b	catalyst is not used up / unchanged (1)	[1]	ignore can be re-used / recycled / does not react. ignore speeds up the reaction.
	c*	7 1	[1]	both correct for 1 mark must be in correct order
	d*	calcium nitrate (1) carbon dioxide and CO ₂ (1) water and H ₂ O (1)	[3]	reject carbon monoxide accept hydrogen oxide numbers in formulae must be smaller than letters. e.g. accept CO ₂ or CO ₂ / H ₂ O or H ₂ O reject CO ₂ or CO ² / H ₂ O or H ² O Maximum (2) marks If extra numbers are written in front of formulae e.g. 2CO ₂ etc
		Total	[8]	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	188 (1)	[1]	
		ii	1.26 g (2) For (1) mark 0.63 g (1)	[2]	allow 1.3 g for (2) allow 0.6 g for (1)
	b	i	Cu^{2+} (1)	[1]	accept Cu^{+2} Charge must be superscripted. reject $\text{Cu}2+$ or Cu_{2+} or Cu_2^+ or 2Cu^{2+} reject '2+' alone
		ii	sulfuric (acid) / H_2SO_4 (1)	[1]	If formula given must be fully correct as shown. allow phonetic spellings of sulfuric e.g. 'sulffurik', but reject 'sulfur'.
		iii	LiNO_3 / $\text{Li}(\text{NO}_3)$ (1)	[1]	allow NO_3Li reject capital I in Li, e.g. LiNO_3 Number 3 must be smaller or subscripted e.g. reject LiNO^3 or $\text{LiNO}3$ reject any numbers in front of formula e.g. 2LiNO_3 reject Li^+NO_3^-
			Total	[6]	

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Chemistry A

General Certificate of Secondary Education **A323/01**

Unit 3: Ideas in Context plus C7

Mark Scheme for June 2010

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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
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

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. 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.

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.

<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, 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.

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, 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		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Expected Answer	Mark	Additional Guidance
1	a	i	more can be grown (1)	[1]	allow cotton can be planted again
		ii	any two from: reference to using fertilisers; reference to using pesticides; cotton is bleached (using harmful chemicals);	[2]	
		iii	these polymers are made from crude oil (1) (crude) oil/polymers are finite/will one day run out/is not renewable (1)	[2]	
	b		they are easier to use/more convenient / they do not need to be washed / they are kinder to a baby's skin (1)	[1]	allow more comfortable for baby / less likely to leak do not allow economy answers
	c	i	from getting the raw material used to make the product to the disposal of the product (1)	[1]	do not allow answers that start from making product from raw material
		ii	any two from: making materials; making the products from the materials; using the products; disposing of the products;	[2]	
	d	i	raw material production (1) manufacture of components (1)	[2]	
		ii	(generation) of electricity used(1) manufacture of detergent (1)	[2]	
			Total	[13]	

Question			Expected Answer	Mark	Additional Guidance
2	a	i	alcohols (1)	[1]	
		ii	C ₂ H ₆ O (1)	[1]	accept C ₂ H ₅ OH
	b		liquid; yes; yes no	[3]	all four correct = 3 marks three correct = 2 marks two correct = 1 mark
	c	i	sugar/glucose (1)	[1]	
		ii	(high concentration of) ethanol kills yeast (1)	[1]	allow the ethanol denatures/destroys the yeast allow ethanol denatures enzymes but do not allow kills enzymes
		iii	distillation (1) plus any two from: mixture is heated/evaporated/boiled; vapour cooled to condense it; ethanol has lower boiling point (so boils off first);	[3]	allow fractional distillation allow explanation marks independent of name but do not give marks for a method that does not separate eg reflux
			Total	[10]	
3	a	i	energy level of reactants is higher than that of products (1) so energy/heat given out during the reaction (1)	[2]	allow energy level at end is lower than at beginning / energy level goes down / energy change is negative
		ii	methane + oxygen → carbon dioxide + water (1)	[1]	Accept symbol equation if correct
	b		taken in/gained/endothemic given out/released/exothermic	[1]	both required for the mark
	c		energy needed to start a reaction (1)	[2]	allow first mark for energy needed for a reaction to take place/begin / energy needed for successful collisions
			energy needed to break bonds (1)		ignore reference to catalysts
			Total	[6]	

Question		Expected Answer	Mark	Additional Guidance	
4	a	<p>any three from: put spots of dyes (on origin); put end of paper in water; in a beaker; leave; until water is nearly at the top of the paper; observe how far dyes have travelled;</p> <p>QWC mark is for an answer that contains at least ten words with no more than one incorrect spelling in each ten words</p>	[3]	allow other acceptable containers	
			[1]		
	b	i	maximum position of solvent travel (1)	[1]	
		ii	pen ink smudges/runs/dissolves in the water (1)	[1]	
	c	i	C (1)	[1]	
		ii	one spot from C travelled same distance up paper as the spot from the banned compound (1)	[1]	allow C has a spot at the same level as banned compound
		iii	distance travelled by solvent (1) distance travelled by (banned) dye (1)	[2]	
	Total			[10]	
5	a	i	measure out 25.0 cm ³ of the stock solution (1) make up to 250 cm ³ with (distilled/deionised) water (1)	[2]	allow one mark for adding 1 part stock solution to 9 parts water ignore references to dilution to a tenth of stock concentration
		ii	g/dm ³ (1)	[1]	
	b	i	not accurate (1)	[1]	
		ii	pipette (1)	[1]	allow burette
	iii	to give a colour change (1) when the alkali has been neutralised / when the solution is neutral (1)	[2]	allow to determine the end point = 2 marks allow fully reacted	
	Total			[7]	

Question			Expected Answer	Mark	Additional Guidance
6	a	i	a chemical that is made in large quantities (1)	[1]	
		ii	(to show that) the reaction is reversible / goes backwards and forwards (1)	[1]	allow to show that it is a (dynamic) equilibrium
	b		air makes the process (more) sustainable(1) because the supply of air is not limited / air is renewable(1) natural gas makes the process less/not sustainable(1) because it is finite/will one day run out/not renewable(1)	[4]	
	c		speed up the reaction (1)	[1]	accept provides an alternative route / lowers activation energy
	d		any two from: tanker vessel must be strong/pressurised/have thick walls; tanker vessel must be leak proof; tanker must carry a hazard warning sign; speed limits for heavy vehicles;	[2]	allow no naked flames
			Total	[9]	

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Chemistry A

General Certificate of Secondary Education **A323/02**

Unit 3: Ideas in Context plus C7

Mark Scheme for June 2010

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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
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

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. 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.

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.

<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, 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.

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, 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	<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

Question		Expected Answer	Mark	Additional Guidance
1	a	<p>any two from: reference to using fertilisers (1) reference to using pesticides (1) cotton is bleached (using harmful chemicals) (1)</p>	[2]	
	b	they are easier to use/more convenient / they do not need to be washed / they are kinder to a baby's skin (1)	[1]	allow more comfortable for baby / less likely to leak do not allow economy answers
	c	from getting the raw material used to make the product to the disposal of the product (1)	[1]	do not allow answers that start from making product from raw material
	d	<p>description: electricity/detergent used for washing (1) explanation: generating electricity causes pollution / detergent released into rivers etc (1)</p>	[2]	allow use of energy instead electricity allow any reasonable explanation of how this causes environmental impact
	e	<p>not everyone would collect used nappies for recycling / may be difficult to collect all used nappies (1) there are not enough recycling plants available / so many nappies are used that this would be difficult (1) there may not be enough demand for the materials produced by recycling (1)</p>	[3]	<p>three areas for marks:</p> <ul style="list-style-type: none"> • collection • huge volume • demand for products
	f	i	[2]	<p>for the first mark candidates must write about forces between chains/molecules not bonds for second mark allow reference to breaking bonds between chains/molecules as long as energy mentioned ignore references to short chains</p>
		ii	[2]	<p>allow make branched polymer</p> <p>allow decreases number/strength of bonds between chains/molecules ignore references to less energy needed</p>
		Total	[13]	

Question		Expected Answer	Mark	Additional Guidance
2	a	sodium + ethanol (slow) fizzing / dissolves / gets smaller / moves slowly across the surface (1) sodium + water (fast) fizzing / dissolves (quickly) / gets smaller (quickly) / shoots around on surface / melts / produces flame (1) sodium + hexane no reaction (1) answer shows that reaction with water is more vigorous than that with ethanol (1)	[4]	one mark each for a valid observation for each of the three demonstrations if a mixture of valid and non-valid observations are made this loses the mark for that box plus one additional mark for a correct comparison of the same observation with ethanol and with water allow bubbling=fizzing=hydrogen/gas given off
	b	similarity: ethanol and water have O-H group/same functional group/oxygen and so react in a similar way (1) difference: hexane has only carbon and hydrogen atoms/does not have an O-H group/does not have oxygen and so does not react (1)	[2]	allow water and ethanol have polar bonds allow hexane is a hydrocarbon/has unreactive C-C and C-H bonds and so does not react to score the answers must refer to the reactions not just to the structures
	c	i	(high concentration of) ethanol kills yeast (1)	[1] allow the ethanol denatures/destroys the yeast allow ethanol denatures enzymes but do not allow kills enzymes
		ii	distillation (1) plus any two from: mixture is heated/evaporated/boiled (1) vapour cooled to condense it (1) ethanol has lower/different boiling point (so is collected on its own/separately) (1)	[3] allow fractional distillation allow explanation marks independent of name but do not give marks for a method that does not separate eg reflux ignore ethanol has low boiling point
			Total	[10]

Question			Expected Answer	Mark	Additional Guidance
3	a		energy level of reactants is higher than that of products (1) so energy/heat given out during the reaction (1)	[2]	allow energy level at end is lower than at beginning / energy level goes down / energy change is negative
	b		energy needed to start a reaction (1) energy needed to break bonds (1)	[2]	allow first mark for energy needed for a reaction to take place/begin / energy needed for successful collisions ignore reference to catalysts
	c	i	(2 x 805 =) 1610 (1) (4 x 464 =) 1856 (1) energy released = 3466 (1)	[3]	allow 3 marks for 3466 without working (even if not on answer line) ignore if go on to calculate 730 here
		ii	730 (1)	[1]	ignore sign (plus or minus) allow ecf from ci give mark for 730 without working
			Total	[8]	
4	a	i	4.8 (1) divided by 7.0 = 0.69 (1)	[2]	give 2 marks for correct answer without working do not allow 4.9 or 0.7 allow 0.68 or 0.685 or 0.686 (max 3 sf)
		ii	Rf value is always the same for each compound (1) distance travelled by spot/solvent front may be different on different chromatograms (1)	[2]	allow can be used to identify compound ignore reference to accuracy/precision
	b		stationary phase is paper and mobile phase is solvent / mobile phase moves up through stationary phase (1) for each compound there is a dynamic equilibrium between the two phases (1) how far each compound moves depends on its distribution between the two phases / if the compound is more soluble in the mobile phase it will move further up the paper (1)	[3]	for third mark allow compounds travel different distances because they have different solubility in phases / dynamic equilibrium is more to one side / spend different amounts of time in the two phases
			Total	[7]	

Question		Expected Answer	Mark	Additional Guidance
5	a	measure out 25.0 cm ³ of the stock solution (1) make up to 250 cm ³ with (distilled/deionised) water (1)	[2]	allow one mark for adding 1 part stock solution to 9 parts water ignore references to dilution to a tenth of stock concentration
	b	i	[1]	be careful not to give this mark just for getting 0.178 the mark is for the correct method used to get 0.178 do not allow a mark for eg 28.2 x 6.3/100 = 0.178
		ii	[3]	allow any correct method for working eg 40 x 6.3/63 x 28.2/1000 allow 0.113 without working for 2 marks
		iii	[2]	allow ecf from mass to concentration ie x40 ignore references to accuracy ignore references to outliers
		Total	[8]	
6	a	air makes the process (more) sustainable (1) because the supply of air is not limited / air is renewable (1) natural gas makes the process less/not sustainable (1) because it is finite/will one day run out/not renewable (1)	[4]	
	b	catalyst provides an alternative route (1) with a lower activation energy / less energy needed to begin the reaction / less energy needed to break bonds (1) QWC is for correct use of the term activation energy (1)	[2] [1]	do not allow marks for other explanations of how a catalyst works ignore references to collisions
	c	reactants/nitrogen and hydrogen that have not reacted are recycled (1) ammonia is removed so the system does not reach equilibrium/reverse reaction is not possible/pushes equilibrium to the right (1)	[2]	no mark simply for saying 85% recycled, must have idea that this gas has not reacted / goes back to react
		Total	[9]	

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