

**Chemistry A
Twenty First Century Science**

General Certificate of Secondary Education **J634**

Mark Scheme for the Units

January 2008

J634/MS/R/08J

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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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GCSE Twenty First Century Science – Chemistry A (J634)

MARK SCHEMES FOR THE UNITS

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Guidance for Examiners

- 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 Each separate marking point is indicated by (1) at the end of that marking point.
- 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** = answers which are not worthy of credit
 - reject** = answers which are not worthy of credit
 - ignore** = statements which are irrelevant
 - allow** = answers that can be accepted
 - () = words which are not essential to gain credit
 - = 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'

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 The list principle: if a list of responses greater than the number requested is given, you 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, i.e. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

8 Marking method for tick boxes:

If there is a set of boxes, some of which should be ticked and others left empty, then you need to judge the entire set of boxes.

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

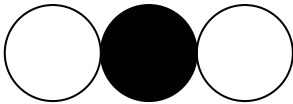


Edinburgh	
Manchester	
Paris	
Southampton	

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). For a two-mark question, the rationale would be:

- All boxes are indicated scores 0 marks.
- All boxes blank scores 0 marks.
- All four boxes correct scores 2 marks.
- Three boxes correct scores 1 mark.
- Two boxes correct scores 1 mark.

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

A321/01 Modules C1, C2, C3 Foundation Tier

Question			Expected Answers	Marks	Rationale																
1	a	i	less (1)	1	Give mark if 'less' indicated in the word list by a ring, line or some other method																
		ii	less fossil fuel will be burned <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td><input type="checkbox"/></td></tr><tr><td>✓</td></tr><tr><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td></tr></table> (1)	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	1	A tick in any other box = 0 marks												
<input type="checkbox"/>																					
✓																					
<input type="checkbox"/>																					
<input type="checkbox"/>																					
		iii	it is cheaper per person <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td><input type="checkbox"/></td></tr><tr><td>✓</td></tr><tr><td><input type="checkbox"/></td></tr></table> (1) won't be stuck in traffic jams <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td><input type="checkbox"/></td></tr><tr><td>✓</td></tr><tr><td><input type="checkbox"/></td></tr></table> (1)	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	2	One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks										
<input type="checkbox"/>																					
✓																					
<input type="checkbox"/>																					
<input type="checkbox"/>																					
✓																					
<input type="checkbox"/>																					
	b		all of them (1)	1	any clear indication of all of them as their choice																
	c		<table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th></th> <th>decreases</th> <th>increases</th> <th>same</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>carbon monoxide</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>nitrogen oxides</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		decreases	increases	same	carbon dioxide		✓		carbon monoxide	✓			nitrogen oxides	✓			2	Carbon dioxide increases = 1 mark More than one tick on the row = 0 marks Carbon monoxide and nitrogen oxides decreases = 1 mark Tick in any other box on these two rows = 0marks
	decreases	increases	same																		
carbon dioxide		✓																			
carbon monoxide	✓																				
nitrogen oxides	✓																				
	d	i	hydrocarbons (1)	1	Give mark if 'hydrocarbons' indicated in the word list by a ring, line or some other method																
		ii		1	Carbon MUST touch two oxygen circles and circles must be in correct order For carbon dioxide there must be one black circle in the middle of two white circles. Need not be linear but the two circles representing oxygen atoms must NOT touch. Allow letters in circles with no shading necessary  Allow lines connecting circles like this: 																
Total				9																	

Question		Expected Answers	Marks	Rationale
2	a	next to the power station	<input checked="" type="checkbox"/> (1)	2 One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks
		less than 500 metres from station	<input checked="" type="checkbox"/> (1)	
		<input type="checkbox"/>		
		<input type="checkbox"/>		
	b	i	Dina (1)	1 More than one response = 0marks
		ii	Josh (1) Hannah (1)	2 One mark for each correct answer in EITHER order. If three names given mark answers and deduct 1 mark. 4 names given = 0
		iii	Hannah (1)	1 More than one response = 0marks
Total			6	

3	a	i	density	<input checked="" type="checkbox"/> (1)	2 One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks
			cost	<input checked="" type="checkbox"/> (1)	
			<input type="checkbox"/>		
			<input type="checkbox"/>		
		ii	flexibility	<input checked="" type="checkbox"/> (1)	1 A tick in any other box = 0 marks
	b			<input type="checkbox"/>	1 A tick in any other box = 0 marks
		wood is a renewable material	<input checked="" type="checkbox"/> (1)		
	c	landfill		3 4 correct (3) 3 correct (2) 2 or 1 correct (1)	
		rot			
		burned			
		recycled			
Total			7		

Question			Expected Answers	Marks	Rationale				
4	a	i	4 (1)	1					
		ii	A (1) C (1)	2	One mark for each correct answer in EITHER order. If three letters given mark answers and deduct 1 mark. 4 letters given = 0				
	b		samples of X may vary <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table> (1)		✓			1	A tick in any other box = 0 marks
✓									
	c		7-12 (1)	1	Allow 12 -7. Allow 5 or 6 or 12-7=5				
Total				5					

5	a		may make children hyperactive <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table> (1)		✓			1	A tick in any other box = 0 marks				
✓													
	b		reduce risk to children's health <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr></table> (1)				✓	1	A tick in any other box = 0 marks				
✓													
	c		<table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> </tr> <tr> <td>✓</td> <td></td> </tr> <tr> <td></td> <td>✓</td> </tr> </tbody> </table>	true	false	✓		✓			✓	2	All three rows correct = 2 marks Two or one row correct = 1 mark Both true and false boxes ticked in one row = incorrect row
true	false												
✓													
✓													
	✓												
Total				4									

Question		Expected Answers	Marks	Rationale								
6	a	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>B</td> <td>D</td> <td>A</td> <td>C</td> <td>(E)</td> </tr> </table> <p>B before D (1) D before A (1) A before C (1)</p>	B	D	A	C	(E)	3	B before D (1 mark); D before A (1 mark); A before C (1 mark); If any letter is used twice. Ignore the second.			
B	D	A	C	(E)								
	b	<p>food is cheaper</p> <p>less land is needed</p> <p>soil structure may be damaged</p> <table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>A</td></tr> <tr><td>A</td></tr> <tr><td>D</td></tr> </table>	A	A	D	2	All three correct = 2 marks Two or one correct = 1 mark					
A												
A												
D												
	c	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">small fields with hedges and ditches</td> <td style="width: 50%; padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">manure instead of fertilizer</td> <td style="padding: 5px;">helps prevent disease</td> </tr> <tr> <td style="padding: 5px;">rotate their crops</td> <td style="padding: 5px;">recycles waste</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">more shelter</td> </tr> </table>	small fields with hedges and ditches		manure instead of fertilizer	helps prevent disease	rotate their crops	recycles waste		more shelter	2	Look at the links as they leave the left-hand boxes. If any left-hand box has more than one link, count those links as incorrect. All three lines correct = 2 marks Two or one line correct = 1 mark
small fields with hedges and ditches												
manure instead of fertilizer	helps prevent disease											
rotate their crops	recycles waste											
	more shelter											
Total			7									

Question		Expected Answers	Marks	Rationale
7	a	exercise (1) diabetes (1)	2	
	b	banning fizzy drink machines <input type="checkbox"/> (1) banning junk food advertising <input checked="" type="checkbox"/> (1)	2	One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks
		Total	4	
		Section total	42	

A321/02 Modules C1, C2, C3 Higher Tier

Question			Expected Answers	Marks	Rationale				
1	a	i	C and F (1)	1	both answers needed for one mark				
		ii	A and E (1)	1	both answers needed for one mark				
	b	i	reaction of nitrogen and oxygen <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> </table> (1)				✓	1	A tick in any other box = 0 marks
✓									
	ii	cause breathing difficulties make acid rain <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td>✓</td></tr> <tr><td> </td></tr> </table>		✓	✓		1	Ticks in second and third boxes required for 1 mark. One tick or any other response = 0 marks.	
✓									
✓									
	c	adding catalytic converters <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> </table> (1)			✓	2	One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks		
✓									
engines work at lower temperatures <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> </table> (1)			✓						
✓									
		Total		6					
2	a	Dina (1)	1	More than one response = 0marks					
	b	Josh (1)	2	One mark for each correct answer in EITHER order. If three names given mark answers and deduct 1 mark. 4 names given = 0					
		Hannah (1)							
c	Hannah (1)	1	More than one response = 0marks						
		Total	4						

Question		Expected Answers	Marks	Rationale
3	a	<p>CO₂ and water vapour are gasses</p> <p>petrol burns</p>	1	Ticks in second and fourth boxes required for 1 mark. One tick or any other response = 0 marks.
	b	<p>carbon dioxide drawn (1) </p> <p>water drawn (1) </p> <p>two correct water and two correct carbon dioxide molecules drawn (1)</p>	3	<p>For carbon dioxide there must be one black circle in the middle of two shaded circles. The two shaded circles must not touch each other.</p> <p>For water there must be one shaded circle in the middle of two blank circles. The two blank circles must not touch each other.</p> <p>Shapes may be linear or bent.</p> <p>For both diagrams:</p> <p>allow letters in circles like this: </p> <p>allow lines connecting circles like this: </p>
Total			4	

Question			Expected Answers	Marks	Rationale
4	a	i	(crude) oil / alkene / ethene / petroleum / naphtha (1)	1	One mark for any correct answer
		ii	polymerisation / polymerising (1)	1	Reject: polymer.
	b		<p>thicker bags last longer</p> <p>total amount of plastic used is less</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>	1	Ticks in third and fifth boxes required for 1 mark. One tick or any other response = 0 marks.
	c		Recycling / recycle / recycled (1)	1	
	d		<p>need for burning fuel is reduced</p> <p>energy made when they burn is used</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> </div>	1	Ticks in third and sixth boxes required for 1 mark. One tick or any other response = 0 marks.
	e		<p>space in landfill but then rot away</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <p style="margin-left: 100px;">(1)</p>	1	A tick in any other box = 0 marks
Total				6	

Question			Expected Answers	Marks	Rationale								
5	a	i	4 (1)	1	Accept: a circle around 'Sample 4' or number '7' in Sample 4. More than one number circled = 0 marks								
		ii	A (1) C (1)	2	One mark for each correct answer in EITHER order. If three letters given mark answers and deduct 1 mark. 4 letters given = 0								
	b		samples of X may vary <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓			1	A tick in any other box = 0 marks				
✓													
	c		7-12 (1)	1	Allow 12 -7. allow 5 or 6 or 12-7=5								
	d		Anna (1)	1	More than one name = 0 marks								
	e	i	cannot slide past each other <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table> (1)				✓	1	A tick in any other box = 0 marks				
✓													
		ii	strong forces between molecules <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> break polymer molecules apart <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table>		✓						✓	1	Ticks in second and fifth boxes required for 1 mark. One tick or any other response = 0 marks.
✓													
✓													
Total				8									

Question		Expected Answers	Marks	Rationale								
6	a	<p>may make children hyperactive</p> <table border="1"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table> <p>(1)</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	A tick in any other box = 0 marks					
<input type="checkbox"/>												
<input checked="" type="checkbox"/>												
<input type="checkbox"/>												
	b	<p>reduce risk to children's health</p> <table border="1"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> </table> <p>(1)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	A tick in any other box = 0 marks				
<input type="checkbox"/>												
<input type="checkbox"/>												
<input type="checkbox"/>												
<input checked="" type="checkbox"/>												
	c	<table border="1"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	true	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<p>All three rows correct = 2 marks Two or one row correct = 1 mark Both true and false boxes ticked in one row = incorrect row.</p>
true	false											
<input checked="" type="checkbox"/>	<input type="checkbox"/>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>											
<input type="checkbox"/>	<input checked="" type="checkbox"/>											
Total			4									

Question		Expected Answers	Marks	Rationale				
7	a		3	<p>Look at the links as they leave the left-hand boxes. If any left-hand box has more than one link, count those links as incorrect.</p> <p>All four lines correct = 3 marks Three lines correct = 2 marks Two lines correct = 1 mark One or no lines correct = 0 marks</p>				
	b	i <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td>✓</td></tr> <tr><td> </td></tr> </table> (1) (1)		✓	✓		2	<p>One mark for each correct answer. If three boxes ticked mark these responses and deduct one mark. If four boxes ticked 0 marks</p>
✓								
✓								
		ii Andy (1) Laura (1)	2	<p>One mark for each correct answer in EITHER order. If three names given mark answers and deduct 1 mark. 4 names given = 0</p>				
		Total	7					

Question		Expected Answers	Marks	Rationale
8	a	E (1) C (1)	2	One mark for each correct answer in EITHER order. If three letters given mark answers and deduct 1 mark. 4 or more letters given = 0
	b	bacteria in the roots of some plants lightning	1	Ticks in second and third boxes required for 1 mark. One tick or any other response = 0 marks.
		Total	3	
		Section total	42	

A322/01 Modules C4, C5, C6 Foundation Tier

Question			Expected Answers	Marks	Rationale				
1	a	i	increases increases / decreases decreases (1)	1	allow either increases and increases for one mark or decreases and decreases for one mark allow pairs of words with the same meaning eg smaller smaller / larger larger / rises rises / falls falls / gets higher gets higher / gets lower gets lower				
	a	ii	gas (1)	1	allow in table more than one circled = 0				
		iii	black (1)	1	more than one circled = 0				
	b	i	chlorine bromine iodine <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)		✓		1	2 nd box	
✓									
		ii	chlorine, bromine and iodine <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)	✓				1	1 st box
✓									
	c		C (1)	1	more than one letter = 0				
			Total	6					

Question			Expected Answers	Marks	Rationale				
2	a	i	Li Na K <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> </table> (1)				✓	1	4 th box
✓									
		ii	Na Mg Ar <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>✓</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table> (1)	✓				1	1 st box
✓									
	b		beryllium (1) 4 (1) 9 (1)	3	allow one mark for 4 and 9 in the wrong order, therefore beryllium 9 4 = 2 marks				
	c		four electrons drawn on or touching the outer shell or circle (1)	1	allow electrons drawn singly or in pairs / x for electron extra shell with electron(s) / extra electrons in inner shell = 0				
	d	i	conducts electricity <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> </table> (1)				✓	1	4 th box
✓									
		ii	2.8 (1) 2.8.8 (1)	2	allow 2.8.0 and 2.8.8.0 ignore + or - symbols				
			Total	9					

Question		Expected Answers	Marks	Rationale						
3	a	sodium chloride / sodium sulfate / sodium carbonate / sodium bromide / potassium chloride / potassium sulfate / potassium carbonate / potassium bromide / magnesium chloride / magnesium carbonate / magnesium bromide / calcium chloride / calcium sulfate / calcium carbonate / calcium bromide	1	not magnesium sulphate formula = 0						
	b	between ions of opposite charge <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)		✓		1	2 nd box			
✓										
	c	able to move around in sea water <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1) contains ions that have positive charges and negative charges <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table> (1)	✓					✓	2	1 st box 4 th box
✓										
✓										
	d	sodium chloride (1)	1	allow Na Cl/ ignore + or - symbols reject sodium chlorine / (common) salt						
Total			5							

Question		Expected Answers	Marks	Rationale
4	a	covalent hard high insoluble does not	4	4 correct (3) 3 correct (2) 2 correct (1)
	b	nitrogen and oxygen (1)	1	both answers required for (1) mark more than two circled = 0
Total			5	

Question		Expected Answers	Marks	Rationale				
5	a	carbon (1)	1	formula = 0				
	b	copper (1) zinc (1)	2	each additional circle above 2 loses one mark				
	c	i	1	2 nd box				
		aluminium is more reactive <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓				
✓								
		ii	1	reject electricity				
Total			5					

Question		Expected Answers	Marks	Rationale
6	a	neutralisation (1)	1	
	b		3	<p>one mark for drawing a line from each acid to the correct alkali <u>and</u> correct salt.</p> <p>two lines to or from one box loses the mark for that salt</p> <p>ignore extra line from phosphoric acid to ammonium hydroxide.</p>
	c	H ₂ (1)	1	more than one circled = 0
Total			5	

Question		Expected Answers	Marks	Rationale				
7	a	filtration / filtering / filter / decantation / decant (1)	1					
	b	i 84 (1) 120 (1)	2	ignore units				
		ii 90 (1)	1	ignore units				
	c	i finishes at the same volume <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table> (1)				✓	1	4 th box
✓								
		ii A D	1	both answers required for one mark must be in the correct order				
		iii increasing the temperature <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)		✓		1	2 nd box	
✓								
		Total	7					
		Section total	42					

A322/02 Modules C4, C5, C6 Higher Tier

Question			Expected Answers	Marks	Rationale				
1	a	i	liquid solid	1	both required for one mark				
		ii	increases increases / decreases decreases (1)	1	allow either increases and increases for one mark or decreases and decreases for one mark allow pairs of words with the same meaning eg smaller smaller / larger larger / rises rises / falls falls / gets higher gets higher / gets lower gets lower				
	b	i	most reactivechlorinebromine least reactiveiodine	2	chlorine first for one mark then bromine and iodine in correct order for one mark. not chlorid <u>e</u> , bromid <u>e</u> , iodid <u>e</u> .				
		ii	chlorine, bromine and iodine <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)	✓				1	1 st box
✓									
	c		Sr ²⁺ / Sr ⁺⁺ / Sr ⁺² (1)	1					
Total				6					

Question			Expected Answers	Marks	Rationale				
2	a	i	K potassium / Br bromine / Sc scandium / Ti titanium / V vanadium / Cr Chromium / Mn Manganese / Fe iron / Co cobalt / Ni nickel / Cu copper / Zn zinc / Ga gallium / Ge germanium / As arsenic / Se selenium / Kr krypton (1)	1	symbol must match name				
		ii	He helium / Ar argon / Kr krypton / Xe xenon / Rn radon (1)	1	symbol must match name				
		iii	eight electrons drawn on or touching each of the second and third shells	1	Allow electrons drawn singly or in pairs				
	b	i	$2\text{Na}_{(s)} + \text{Cl}_{2(g)} \rightarrow 2\text{NaCl}_{(s)}$ formulae Na, Cl ₂ , NaCl (1) balance 2Na and 2NaCl (1) state symbols (s), (g) and (s) (1)	3	balance mark not available if any formula incorrect. states written as words eg. solid and gas = 0.				
		ii	conducts electricity <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table> (1)				✓	1	4 th box
✓									
iii	2.8 (1) 2.8.8 (1)	2	allow 2.8.0 and 2.8.8.0 ignore + or - symbols						
Total				9					

Question			Expected Answers	Marks	Rationale					
3	a	i	sodium chloride NaCl / sodium sulfate NaSO ₄ / sodium carbonate Na ₂ CO ₃ / sodium bromide NaBr / potassium chloride KCl / potassium sulfate K ₂ SO ₄ / potassium carbonate K ₂ CO ₃ / potassium bromide KBr / magnesium chloride MgCl ₂ / magnesium carbonate MgCO ₃ / magnesium bromide MgBr ₂ / calcium chloride CaCl ₂ / calcium sulfate CaSO ₄ / calcium carbonate CaCO ₃ / calcium bromide CaBr ₂	2	not magnesium sulfate MgSO ₄ one mark for name and one mark for formula Ignore + or – symbols if given					
		ii	sodium chloride (1)	1	allow Na Cl / or Na ⁺ Cl ⁻ ignore + or - symbols reject sodium chlorine / (common) salt					
	b	able to move around in sea water <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">✓</td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td style="text-align: center;">✓</td></tr></table> contains ions that have positive charges and negative charges	✓			✓	1	1 st box and 4 th box both required for one mark		
✓										
✓										
	c	ions attraction opposite	1	all three in correct order for one mark						
	d	high melting point low electrical conductivity <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td style="text-align: center;">✓</td></tr><tr><td style="text-align: center;">✓</td></tr></table>					✓	✓	1	5 th box and 6 th box both required for one mark a tick in any other box = 0
✓										
✓										
Total			6							

Question		Expected Answers	Marks	Rationale
4	a	covalent four high low low	3	all five correct (3) 4 correct (2) 3 correct (1)
	b	hydrogen oxygen nitrogen (1)	1	all three in any order for one mark
Total			4	

Question		Expected Answers	Marks	Rationale
5	a	$2\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Fe} + 3\text{CO}_2$ formulae Fe and CO_2 (1) balance using 4 numbers shown - 2 3 4 3 (1)	2	balance mark not available if any formula incorrect. Fe and CO_2 can be in any order. 4 must be with Fe and 3 must be with CO_2 .
	b	800 (1) 160 (1) 560 (1)	3	
Total			5	

Question		Expected Answers	Marks	Rationale
6	a		3	<p>one mark for drawing a line from each acid to the correct alkali <u>and</u> correct salt.</p> <p>two lines to or from one box loses the mark for that salt</p> <p>ignore extra line from phosphoric acid to ammonium hydroxide.</p>
	b	i	$\text{H}^+ / \text{H}_3\text{O}^+$ (1)	1
		ii	OH^- (1)	1
		iii	$\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} / \text{H}_3\text{O}^+ + \text{OH}^- \rightarrow 2\text{H}_2\text{O}$ (1)	1
		Total		6

Question			Expected Answers	Marks	Rationale																		
7	a	i	90 (1)	1																			
		ii	8.4 (1)	1																			
	b	i	A D	1	both answers required for one mark must be in the correct order																		
		ii	<table border="1"> <thead> <tr> <th>slower</th> <th>same</th> <th>faster</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>✓</td> <td></td> <td></td> </tr> <tr> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>✓</td> <td></td> <td></td> </tr> <tr> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>	slower	same	faster			✓	✓				✓		✓				✓		3	5 correct (3) 4 correct (2) 3 correct (1)
slower	same	faster																					
		✓																					
✓																							
	✓																						
✓																							
	✓																						
Total				6																			
Section total				42																			

Grade Thresholds

General Certificate of Secondary Education
Chemistry A (Specification Code J634)
January 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A321/01	Raw	42	N/A	N/A	N/A	33	28	23	19	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A321/02	Raw	42	36	32	27	22	16	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A322/01	Raw	42	N/A	N/A	N/A	25	21	17	14	11	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A322/02	Raw	42	35	28	21	14	8	5	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	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

No candidates were entered for aggregation this series. First aggregation opportunity is in June 2008.

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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