

**Chemistry A
Twenty First Century Science**

General Certificate of Secondary Education **J634**

Mark Scheme for the Units

January 2009

J634/MS/R/09J

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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 a (1) at the end of that marking point.
4. Abbreviations, annotations and conventions used in the detailed Mark Scheme:

ORA = or reverse argument

NOT = point that is not given credit

AW/owtte = alternative wording/or words to that effect: allow any expression that is clearly equivalent

/ = Alternative and acceptable answers for the same marking point

point = point must be present to gain the mark

(description) = description which need not be present to gain the mark

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

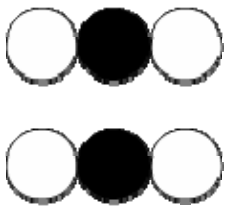
Two boxes correct scores 1 mark.

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	<table border="1"> <thead> <tr> <th>gases present in both...</th> <th>gases present only in...</th> </tr> </thead> <tbody> <tr> <td>argon</td> <td>carbon monoxide</td> </tr> <tr> <td>nitrogen</td> <td>nitrogen dioxide</td> </tr> <tr> <td>oxygen</td> <td></td> </tr> </tbody> </table>	gases present in both...	gases present only in...	argon	carbon monoxide	nitrogen	nitrogen dioxide	oxygen			3	<p>do not count any name appearing in both columns names can appear in any order all 5 in correct columns (3) 3 or 4 correct (2) 2 correct (1) 1 or fewer correct (0)</p> <p>Do not penalise poor spelling Accept formulae, e.g. O₂ for Oxygen (not O), Ar for Argon (not AR), N₂ for Nitrogen (not N), CO for Carbon Monoxide (not Co), NO₂ for Nitrogen Dioxide (not NO or No)</p> <p>Ignore any extra gases</p>	
gases present in both...	gases present only in...													
argon	carbon monoxide													
nitrogen	nitrogen dioxide													
oxygen														
	b	<table border="1"> <thead> <tr> <th>product from burning petrol</th> <th>atoms from petrol</th> <th>atoms from air</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide, CO₂</td> <td>carbon</td> <td>oxygen</td> </tr> <tr> <td>water, H₂O</td> <td>hydrogen</td> <td>oxygen</td> </tr> </tbody> </table>	product from burning petrol	atoms from petrol	atoms from air	carbon dioxide, CO ₂	carbon	oxygen	water, H ₂ O	hydrogen	oxygen		2	<p>mark row across the table each correct row scores (1)</p> <p>Ignore symbols</p> <p>Names must be correct eg not 'oxide'</p>
product from burning petrol	atoms from petrol	atoms from air												
carbon dioxide, CO ₂	carbon	oxygen												
water, H ₂ O	hydrogen	oxygen												

Question			Expected Answers	Marks	Rationale
2	a	i	<p>Total sulfur dioxide released decreased... (1)</p> <p>The number of coal fired power stations decreased...(1)</p>	2	one mark each for ticks in boxes 1 and 5
		ii	<p>Coal contains more sulfur-containing.. (1)</p>	1	

Question			Expected Answers	Marks	Rationale					
2	a	iii	<p>low-sulfur petrol and diesel fuels...(1)</p> <p>devices were fitted to remove...(1)</p> <div style="display: flex; align-items: center; margin-left: 20px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;">✓</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;">✓</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> </table> </div>		✓		✓		2	One mark each
✓										
✓										
	b		<div style="text-align: center;">  </div>	2	<p>(1) for each correct set of three circles, two white and one black, joined together in order white black white</p> <p>allow circle with c for black and circle with o for white</p> <p>allow lines to represent touching</p> <p>each circle in a set of three must touch another to get the mark, circles can touch at any angle, but two whites must not touch</p> <p>assume a shaded circle is black unless it obviously has vertical stripes, which will not score</p>					
Total				7						

Question		Expected Answers	Marks	Rationale																		
3	a	cotton silk wool	2	Three correct circles = 2, two circles correct = 1, one correct circle = 0																		
	b	<table border="1"> <thead> <tr> <th>statement</th> <th>advantage</th> <th>disadvantage</th> </tr> </thead> <tbody> <tr> <td>...stronger than paper</td> <td>✓</td> <td></td> </tr> <tr> <td>...gives off poisonous fumes when burned</td> <td></td> <td>✓</td> </tr> <tr> <td>...is waterproof</td> <td>✓</td> <td></td> </tr> <tr> <td>...more flexible than paper</td> <td>✓</td> <td></td> </tr> <tr> <td>...does not rot in landfill sites</td> <td></td> <td>✓</td> </tr> </tbody> </table>	statement	advantage	disadvantage	...stronger than paper	✓		...gives off poisonous fumes when burned		✓	...is waterproof	✓		...more flexible than paper	✓		...does not rot in landfill sites		✓	3	5 rows correct = 3 4 rows correct = 2 3 rows correct = 1 1 or 2 rows correct = 0
statement	advantage	disadvantage																				
...stronger than paper	✓																					
...gives off poisonous fumes when burned		✓																				
...is waterproof	✓																					
...more flexible than paper	✓																					
...does not rot in landfill sites		✓																				

Question		Expected Answers			Marks	Rationale															
3	c	<table border="1"> <thead> <tr> <th>materials</th> <th>single chemical</th> <th>mixture</th> </tr> </thead> <tbody> <tr> <td>iron</td> <td>✓</td> <td></td> </tr> <tr> <td>milk</td> <td></td> <td>✓</td> </tr> <tr> <td>wood</td> <td></td> <td>✓</td> </tr> <tr> <td>distilled water</td> <td>✓</td> <td></td> </tr> </tbody> </table>			materials	single chemical	mixture	iron	✓		milk		✓	wood		✓	distilled water	✓		2	4 rows correct = 2 2 or 3 rows correct = 1 1 row correct = 0
materials	single chemical	mixture																			
iron	✓																				
milk		✓																			
wood		✓																			
distilled water	✓																				
		Total			7																

Question			Expected Answers	Marks	Rationale				
4	a	i	<p>The range of results is too large (1)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px; text-align: center;">✓</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> </table>			✓		1	One tick in box 3
✓									
		ii	4 (1)	1					
		iii	12 mm (1)	1	allow 12 / 12.0 / twelve any other answer (0) Ignore "sample 3"				

Question			Expected Answers	Marks	Rationale
5	a	i	E (1)	1	two or more letters (0) any other answer (0)
		ii	A (1)	1	two or more letters (0) any other answer (0)
		iii	A (1)	1	two or more letters (0) any other answer (0)
	b		hydrogen (1) oxygen (1)	2	One mark each
	c		<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>when crops are harvested nitrogen...(1)</p> <p>with less nitrogen the land...(1)</p> </div> <div style="border: 1px solid black; padding: 2px;"> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> </div> </div>	2	One mark each
Total				7	

Question		Expected Answers	Marks	Rationale								
6	a	<table border="1"> <tr> <td>Fat</td> <td>green</td> </tr> <tr> <td>Saturates</td> <td>green</td> </tr> <tr> <td>Sugar</td> <td>red</td> </tr> <tr> <td>Salt</td> <td>amber</td> </tr> </table>	Fat	green	Saturates	green	Sugar	red	Salt	amber	1	all four colours in the correct boxes (1) any other answer (0) two colours in one box scores (0)
Fat	green											
Saturates	green											
Sugar	red											
Salt	amber											
	b	<p>The maximum amount of each food.. (1)</p> <table border="1"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> <tr><td>✓</td></tr> </table>				✓	1					
✓												

Question			Expected Answers	Marks	Rationale
6	c	i	<p>The sugar in these products is... (1)</p> <p>Eating these products may cause... (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div>	2	One mark each
		ii	red sugar	1	both red and sugar must be circled for (1) any other word circled in either space circled (0) two or more words circled in each space (0)
	d		<p>It is an independent food safety watchdog (1)</p> <p>It protects the public's health and consumer interest in food (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> </div>	2	One mark each
Total				7	
Paper Total				42	

A321/02 Modules C1, C2, C3 Higher Tier

Question			Expected Answers	Marks	Rationale
1	a	i	<p>The range of results is too large (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div>	1	one mark for a tick in box 3
		ii	12	2	11 scores (1)
		iii	<p>Taking more measurements reduces... (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> </div> <p>There may be small variations... (1)</p>	2	one mark each for ticks in boxes 1 and 5

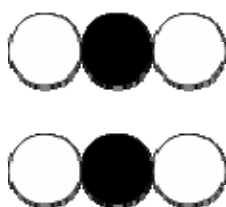
Question		Expected Answers	Marks	Rationale
1	b	<p>The mean for the results from... (1) <input checked="" type="checkbox"/></p> <p>The mean for the results from... (1) <input checked="" type="checkbox"/></p>	2	one mark each for ticks in boxes 1 and 4
	c	<p>Liquid sap can be obtained from the.. (1) <input checked="" type="checkbox"/></p> <p>Crude oil is a finite resource (1) <input checked="" type="checkbox"/></p>	2	one mark each for ticks in boxes 1 and 5
		Total	9	

Question			Expected Answers	Marks	Rationale
2	a	i	E (1)	1	more than one letter = 0
		ii	A (1)	1	more than one letter = 0
		iii	A (1)	1	more than one letter = 0
	b		hydrogen / H ₂ / H (1) oxygen / O ₂ / O (1)	2	one mark for each correct word or symbol allow either order
	c		phosphorus / P (1) potassium / K (1)	2	one mark for each correct word or symbol allow either order
			Total	7	

Question			Expected Answers	Marks	Rationale
3	a			3	<p>all lines from and to correct boxes (3) three or four lines from and to correct boxes (2) two lines from and to correct boxes (1)</p> <p>more than one line from or to a box negates the mark</p>

Question			Expected Answers	Marks	Rationale
3	b	i	<p>The chance of aspartame causing them harm (1)</p> <div style="display: flex; align-items: center;"> <input type="checkbox"/> </div> <p>The consequences of the harm aspartame may do to them (1)</p> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> </div>	2	one mark each for ticks in boxes 1 and 4
		ii	<p>We do not know whether aspartame... (1)</p> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> </div> <p>If you are not sure about the outcome... (1)</p> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> </div>	2	one mark each for ticks in boxes 2 and 5
Total				7	

Question		Expected Answers	Marks	Rationale												
4	a	<p>Because there is not enough... (1) <input checked="" type="checkbox"/></p> <p>Some of the carbon dioxide... (1) <input checked="" type="checkbox"/></p> <p>Some of the carbon atoms... (1) <input checked="" type="checkbox"/></p>	3	one mark each for ticks in boxes 1, 4 and 6												
	b	<table border="1"> <thead> <tr> <th>product from one molecule of propane</th> <th>total number of carbon atoms</th> <th>total number of hydrogen atoms</th> <th>total number of oxygen atoms</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td>3</td> <td style="background-color: #cccccc;"></td> <td>6</td> </tr> <tr> <td>water</td> <td style="background-color: #cccccc;"></td> <td>8</td> <td>4</td> </tr> </tbody> </table>	product from one molecule of propane	total number of carbon atoms	total number of hydrogen atoms	total number of oxygen atoms	carbon dioxide	3		6	water		8	4	2	<p>judge the two answer boxes in each row</p> <p>each correct row scores (1)</p> <p>ignore any numbers filled into the shaded boxes</p>
product from one molecule of propane	total number of carbon atoms	total number of hydrogen atoms	total number of oxygen atoms													
carbon dioxide	3		6													
water		8	4													
		Total	5													

Question			Expected Answers	Marks	Rationale				
5	a	i	C (1)	1	more than one letter = 0				
		ii	D and E (1)	1	both needed in either order; more than one letter for either = 0				
		iii	B and D (1)	1	both needed in either order; more than one letter for either = 0				
		iv	<p>Low-sulfur petrol and diesel fuels... (1)</p> <div style="display: flex; align-items: center; margin-left: 300px;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <input checked="" type="checkbox"/> </div> <p>Devices were fitted to remove... (1)</p> <div style="display: flex; align-items: center; margin-left: 300px;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <input checked="" type="checkbox"/> </div>	2	one mark each for ticks in boxes 2 and 4				
b	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">A</td> <td style="text-align: center;">F</td> <td style="text-align: center;">D</td> <td style="text-align: center;">B</td> <td style="text-align: center;">G</td> </tr> </table>	C	A	F	D	B	G	2	<p>letter E absent from boxes (1)</p> <p>first five letters in correct order (1)</p>
C	A	F	D	B	G				
c	<div style="text-align: center;">  </div>	2	<p>(1) for each correct set of three circles, two white and one black, joined together in order white black white</p> <p>allow circle with c for black and circle with o for white</p> <p>allow lines to represent touching</p> <p>each circle in a set of three must touch another to get the mark, circles can touch at any angle, but two whites must not touch</p> <p>assume a shaded circle is black unless it obviously has vertical stripes, which will not score</p>						
Total				9					

Question		Expected Answers	Marks	Rationale
6	a	<p>...environmental impact of making (1)</p> <p>...environmental impact of using... (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px;"></div> </div>	2	one mark each for ticks in boxes 3 and 4
	b	<p>plasticiser</p> <p>chains</p> <p>energy</p> <p>melts</p>	2	all four correct for (2) two or three correct for (1)
	c	<p>Making the chain length of the polymer shorter (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px;"></div> </div>	1	one mark for a tick in box 2
Total			5	
Paper Total			42	

A322/01 Modules C4, C5, C6 Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	<p>the piece of sodium fizzes (1)</p> <p>the piece of sodium moves around quickly (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	2	one mark each for ticks in boxes 4 and 5
	b	<p>the chemicals are very hazardous (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	1	one mark for a tick in box 1
	c	Na (1)	1	

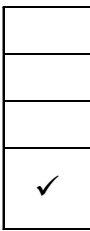
Question		Expected Answers	Marks	Rationale
1	d	<p>when sodium is cut it is very shiny (1)</p> <p>sodium goes dull very quickly (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px; text-align: center;">✓</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px; text-align: center;">✓</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-right: 5px;"></div> </div>	2	one mark each for ticks in boxes 1 and 3
	e	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">potassium</div> <div style="border: 1px solid black; padding: 2px;">is in the same group as sodium... .</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">lithium</div> <div style="border: 1px solid black; padding: 2px;">has the symbol K.</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">calcium</div> <div style="border: 1px solid black; padding: 2px;">reacts with sodium to make a salt.</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">chlorine</div> <div style="border: 1px solid black; padding: 2px;">is a metal and is in a different... .</div> </div>	2	<p>all four correct (2)</p> <p>2 or 3 correct (1)</p> <p>More than one line to or from a box means that box cannot score</p>
Total			8	

Question		Expected Answers	Marks	Rationale
2	a	group metal period non-metal	3	all four correct (3) 3 correct (2) 2 correct (1) 1 correct (0)
	b	nine (1) seven (1) neutrons (1)	3	allow numbers 9 and 7
Total			6	

Question	Expected Answers	Marks	Rationale												
<p>3 a</p>		<p>3</p>	<p>all four correct (3) 3 correct (2) 2 correct (1) 1 correct (0)</p> <p>More than one line to or from a box means that box cannot score</p>												
<p>b</p>	<table border="1"> <thead> <tr> <th>statement</th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>Gases are good conductors of electricity</td> <td></td> <td>✓</td> </tr> <tr> <td>Gases are made of small molecules</td> <td>✓</td> <td></td> </tr> <tr> <td>There are very weak forces of attraction between gas molecules</td> <td>✓</td> <td></td> </tr> </tbody> </table>	statement	true	false	Gases are good conductors of electricity		✓	Gases are made of small molecules	✓		There are very weak forces of attraction between gas molecules	✓		<p>2</p>	<p>3 correct (2) 2 correct (1) 1 correct (0)</p>
statement	true	false													
Gases are good conductors of electricity		✓													
Gases are made of small molecules	✓														
There are very weak forces of attraction between gas molecules	✓														
<p>Total</p>		<p>5</p>													

Question			Expected Answers	Marks	Rationale
4	a		9.5 (1)	1	
	b	i	most silicon and oxygen in the Earth's crust is in the form... the table shows that there are large amounts of silicon ...	1	one mark for ticks in both boxes 2 and 3
		ii	high melting point (1) does not dissolve in water (1)	2	one mark each for ticks in boxes 1 and 2
	c		there would be a lot of waste...(1)	1	one mark for a tick in box 3
	d		reduction (1)	1	one mark for a tick in box 4
Total				6	

Question		Expected Answers	Marks	Rationale
5		electricity negative oxygen	2	3 correct (2) 2 correct (1) 1 correct (0)
		Total	2	

Question		Expected Answers	Marks	Rationale
6	a	sulfuric (acid) (1) H ₂ SO ₄ (1)	2	ignore hydrogen sulphate do not allow lower case symbols eg h symbol O must be at least half height of symbol S numbers must be subscripts or clearly smaller than letters allow other order eg SO ₄ H ₂
	b	litmus paper (1) 	1	one mark for a tick in box 4
	c	larger, faster, higher, more	2	all four correct (2) 3 or 2 correct (1) 1 or 0 correct (0)
	d	i		
		81 (1)	1	
		ii		
		25 % (1)	1	

Question		Expected Answers	Marks	Rationale
6	e	<p>Liz spilt some of her product out of the beaker (1)</p> <p>Liz did not measure out enough acid (1)</p>	2	one mark each for ticks in boxes 1 and 5
	f	<p>The product has not been purified (1)</p>	1	one mark for a tick in box 2
		Total	10	

Question		Expected Answers	Marks	Rationale
7	a	<p>sodium carbonate</p> <p>hydrochloric acid</p> <p>magnesium oxide</p> <p>magnesium hydroxide</p> <p>HCl</p> <p>Na₂CO₃</p> <p>Mg(OH)₂</p> <p>MgO</p>	3	<p>all four correct (3) 2 or 3 correct (2) 1 correct (1)</p> <p>More than one line to or from a box means that box cannot score</p>
7	b	<p>Wear goggles (1)</p> <p>Make sure she does not get splashes ... (1)</p> <p><input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/></p>	2	one mark each for ticks in boxes 1 and 5
		Total	5	
		Paper Total	42	

A322/02 Modules C4, C5, C6 Higher Tier

Question		Expected Answers	Marks	Rationale
1	a	hydrogen and H ₂ (1) correct formula NaOH (1) balanced 2Na and 2NaOH (1)	3	Allow elements in any order e.g. OHNa Do not allow NA or Na Balancing mark can only be scored if formulae are correct
	b	when sodium is cut it is very shiny (1) <input checked="" type="checkbox"/> sodium goes dull very quickly (1) <input checked="" type="checkbox"/>	2	one mark each for ticks in boxes 1 and 3
	c	... 12 neutrons <input checked="" type="checkbox"/> ... one electron in the outer shell <input checked="" type="checkbox"/> ... 3 electron shells <input checked="" type="checkbox"/>	2	all 5 correct (2) 2 – 4 correct (1) 1 correct (0)

Question		Expected Answers	Marks	Rationale
1	d	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; width: 100px;">potassium</div> <div style="border: 1px solid black; padding: 2px 5px; width: 150px; margin-left: 10px;">s in the same group as sodium but is less reactive</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; width: 100px;">lithium</div> <div style="border: 1px solid black; padding: 2px 5px; width: 150px; margin-left: 10px;">has the symbol K</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; width: 100px;">calcium</div> <div style="border: 1px solid black; padding: 2px 5px; width: 150px; margin-left: 10px;">reacts with sodium to make salt</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; width: 100px;">chlorine</div> <div style="border: 1px solid black; padding: 2px 5px; width: 150px; margin-left: 10px;">s & meta and is in a different group to sodium</div> </div> </div>	2	<p>all four correct (2) 2 or 3 correct (1)</p> <p>More than one line to or from a box means that box cannot score</p>
		Total	9	

Question		Expected Answers	Marks	Rationale
2	a	<p>look for a particular colour in the flame (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 15px;"></div> </div>	1	one mark for a tick in box 4
	b	Ca ²⁺ (1)	1	Do not allow CA ²⁺
	c	8 (1)	1	
	d	<p>calcium chloride solution contains ions (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px;"></div> </div> <p>the particles in the solution are free to move (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 15px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 15px;"></div> </div>	2	one mark each for ticks in boxes 1 and 5
		Total	5	

Question		Expected Answers	Marks	Rationale
3	a		3	all 4 correct (3) 3 correct (2) 2 correct (1) 1 correct (0) More than one line to or from a box means that box cannot score
	b	i	oxygen (1)	1
		ii	iron (1)	1
			Total	5

Question			Expected Answers	Marks	Rationale
4	a		B (1)	1	
	b		A (1)	1	
	c		D (1)	1	
			Total	3	

Question		Expected Answers	Marks	Rationale
5	a	reduction (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	1	one mark for a tick in box 4
	b	aluminium is too reactive (1) <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	one mark for a tick in box 2
	c	3e / 3e- (1) Al (1)	2	Allow large lower case 'l' but do not allow AL
	d	Large amounts of ore need to be mined for the process (1) <input checked="" type="checkbox"/> aluminium extraction uses large amounts of electricity (1) <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	2	one mark each for ticks in boxes 1 and 2
		Total	6	

Question		Expected Answers	Marks	Rationale					
6	e	<p>The product has not been purified (1)</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><tr><td><input type="checkbox"/></td></tr><tr><td><input type="checkbox"/></td></tr></table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	one mark for a tick in box 2
<input type="checkbox"/>									
<input checked="" type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									
Total			9						

Question			Expected Answers	Marks	Rationale
7	a	i	A (1)	1	
		ii	D (1)	1	
	b		<p>she uses half as much magnesium (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	1	one mark for a tick in box 3
	c		<p>The curve on the graph is steeper at the beginning (1)</p> <p>The graph levels out sooner (1)</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	2	one mark each for ticks in boxes 2 and 3
Total				5	
Paper Total				42	

Grade Thresholds

General Certificate of Secondary Education
Chemistry A (Specification Code J634)
January 2009 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	27	22	18	14	10	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A321/02	Raw	42	34	30	25	21	16	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	20	N/A	N/A	0
A322/01	Raw	42	N/A	N/A	N/A	28	25	22	19	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A322/02	Raw	42	38	32	25	19	14	11	N/A	N/A	0
	UMS	50	45	40	35	30	25	20	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

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

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J634	20.0	40.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	5

128 candidates were entered for aggregation this series.

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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