



GCSE

Chemistry A

General Certificate of Secondary Education **A322/02**

Unit 2: Modules C4, C5, C6

Mark Scheme for June 2010

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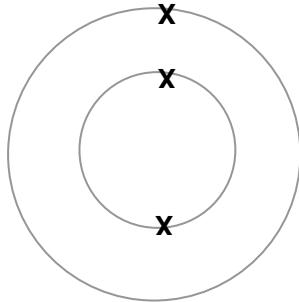
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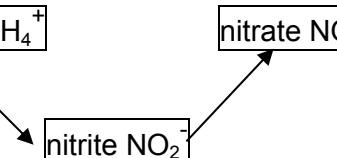
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Question		Expected Answers	Marks	Additional Guidance																		
1	a	FROM <u>dark grey</u> TO <u>purple</u> (1)	[1]	both colours required for 1 mark Order must be clear.																		
	b	I ₂ (aq) (1)	[1]	both required for 1 mark reject (ag)																		
	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" style="margin-left: auto; margin-right: auto;"> <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																				
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...forms an ion...	✓																					
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		Total	[9]																			

Question		Expected Answers	Marks	Additional Guidance												
2	a i	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>particle</td> <td>name of particle</td> <td>charge</td> </tr> <tr> <td>●</td> <td>neutron</td> <td>0</td> </tr> <tr> <td>○</td> <td>proton</td> <td>+1</td> </tr> </table> } (1) } (1) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>relative mass</td> </tr> <tr> <td>1</td> </tr> <tr> <td>1</td> </tr> </table> 	particle	name of particle	charge	●	neutron	0	○	proton	+1	relative mass	1	1	[2]	<p>charge on proton must have + sign</p> <p>accept 'neutral/none/no charge' for charge on neutron and 'positive' for charge on proton.</p> <p>accept +1 for relative mass but reject -1</p>
particle	name of particle	charge														
●	neutron	0														
○	proton	+1														
relative mass																
1																
1																
	ii	<p>3 electrons showing configuration 2,1 (1)</p> 	[1]	<p>2 X's anywhere in first shell, 1 X anywhere in second shell</p> <p>accept any other symbols for electrons e.g. e or o</p>												
	b	<p>...larger relative mass...</p> <p>...total charge...</p> <p>...more protons and electrons...</p> <p>...by gaining one electron.</p> <p>...shells of electrons...</p>	<table style="margin-left: 100px;"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" 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> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	true	false	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2]	<p>all five correct = 2 marks</p> <p>four correct = 1 mark</p> <p>three or less correct = 0 marks</p>	
true	false															
<input type="checkbox"/>	<input checked="" type="checkbox"/>															
<input checked="" type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input checked="" type="checkbox"/>															
<input type="checkbox"/>	<input checked="" 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_2O_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	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;"> $\text{ammonium } \text{NH}_4^+$ </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> $\text{nitrate } \text{NO}_3^-$ </div> <div style="margin: 0 20px;">  </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> $\text{nitrite } \text{NO}_2^-$ </div> </div> <p>Fully correct = (2) (1) mark for either... All three names correct in correct places; All three formulae correct in correct places; Any 2 boxes fully correct;</p>	[2]	ignore extra words in boxes unless more than one name or formula of a substance is given.
	b	<p>i 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]	ignore 'has 40% mass of carbon and/or 8% hydrogen' accept 'higher mass of carbon in the compound' or 'in the molecule' ignore 'higher mass of carbon' alone ignore 'There are <u>only</u> 3 carbon atoms'; If number of atoms are given, they must be correct. accept reverse arguments If atomic masses of atoms are given, they must be correct.

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 Cu2+ 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]	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
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Telephone: 01223 553998

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