



GCSE

Chemistry A

General Certificate of Secondary Education

Unit **A322/01**: Modules C4, C5, C6 (Foundation Tier)

Mark Scheme for June 2011

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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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Question			Answer	Mark	Guidance
1	a		sodium chloride (1) Na (1)	2	
	b		Chlorine gas has two atoms in each ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	
	c		<input type="checkbox"/> The regular arrangement of ions ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> The ions move around the water. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	
	d		<div> <div>state symbol</div> <div><input type="text"/> (s)</div> <div><input type="text"/> (l)</div> <div><input type="text"/> (g)</div> </div> <div> <div>formula</div> <div><input type="text"/> Br₂</div> <div><input type="text"/> Br₂</div> <div><input type="text"/> Be₂</div> <div><input type="text"/> Br₂</div> </div> <div> <div>bromine liquid</div> </div>	2	1 mark for the correct line on each side. any additional line scores 0 for that 'side'.
	e		sodium bromide (1)	1	
Total				[8]	

Question			Answers	Mark	Guidance
2	a		Cs; 55;	1	both correct for one mark.
	b		<p>any four from:</p> <p>lithium has a lower (relative) atomic mass/ lithium has an atomic mass of 7, potassium 39</p> <p>lithium has fewer protons than potassium / lithium has 3 protons, potassium has 19 protons ;</p> <p>lithium has fewer electrons than potassium / lithium has 3 electrons, potassium has 19 electrons;</p> <p>lithium has fewer neutrons than potassium / lithium has 4 neutrons, potassium contains 20 neutrons;</p> <p>lithium has fewer electron shells / lithium has 2 shells, potassium has 4 / lithium is 2,1 and potassium is 2,8,8,1 ;</p> <p>both have 1 electron <u>in outer shell</u> / same number of electrons <u>in the outer shell</u>;</p> <p>(in both types of atom) the number of protons is equal to the number of electrons;</p>	4	<p>Ignore lithium has a lower atomic number (in the question)</p> <p>If numbers for protons, electrons, neutrons or shells are given, they must be correct</p> <p>allow correct “dot and cross” diagrams for both atoms</p> <p>If no other marks are scored, allow (1) only for... they contain different numbers of protons / electrons / neutrons /atomic masses;</p>

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Question			Answers	Mark	Guidance
	c		<div style="text-align: right;"> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> </div> <p>The colour of the flame.</p>	1	
			Total	[6]	

3	a		potassium sulfate/ potassium sulphate (1)	1	
	b		NaNO₃ <u>and</u> K₃PO₄ (1)	1	both needed for one mark.
	c	i	H⁺ (1)	1	
		ii	Ca(OH)₂ (1)	1	
	d	i	A D E B C	2	A D first for one mark. all correct for two marks
		ii	<div style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) </div> <p>titration</p>	1	
			Total	[7]	

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Question		Answer	Mark	Guidance
4	a	<div style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div> starts fast and slows down	1	
	b	any two from: use more concentrated acid; use smaller pieces of calcium carbonate; use a higher temperature.	2	accept use a catalyst ignore “change” temperature/ calcium carbonate etc allow increase surface area allow “stronger” acid ignore just “high” temperature or concentration (should be a comparison)
	c	any two from: add UI solution / dip paper in; look at colour / compare to chart.	2	accept acid turns UI red / orange do not accept incorrect colour changes
	d	→ calcium chloride (1) + carbon dioxide (1) H ₂ O (1)	3	allow the carbon dioxide and calcium chloride either way round not superscript numbers, and numbers need to be visibly smaller than the letters
Total			[8]	

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Question			Expected Answers				Marks	Additional Guidance																	
5	a	i	17 (1)				1																		
		ii	<table><tr><td></td><td>true</td><td>false</td></tr><tr><td>there is more oxygen than nitrogen in the air</td><td></td><td>✓</td></tr><tr><td>there is more oxygen than nitrogen in the Earth's crust</td><td>✓</td><td></td></tr><tr><td>the air and the Earth's crust contain completely different elements</td><td></td><td>✓</td></tr><tr><td>some of the elements in the Earth's crust are metals</td><td>✓</td><td></td></tr></table>					true	false	there is more oxygen than nitrogen in the air		✓	there is more oxygen than nitrogen in the Earth's crust	✓		the air and the Earth's crust contain completely different elements		✓	some of the elements in the Earth's crust are metals	✓		2	all 4 correct = 2 marks 2 / 3 correct = 1 mark 1 correct = 0 marks		
	true	false																							
there is more oxygen than nitrogen in the air		✓																							
there is more oxygen than nitrogen in the Earth's crust	✓																								
the air and the Earth's crust contain completely different elements		✓																							
some of the elements in the Earth's crust are metals	✓																								
	b		<table><tr><th>chemicals</th><th>formula</th><th>element</th><th>compound</th></tr><tr><td>oxygen</td><td>O₂</td><td>✓</td><td></td></tr><tr><td>nitrogen</td><td>N₂</td><td>✓</td><td></td></tr><tr><td>carbon dioxide</td><td>CO₂</td><td></td><td>✓</td></tr><tr><td>silicon dioxide</td><td>SiO₂</td><td></td><td>✓</td></tr></table>	chemicals	formula	element	compound	oxygen	O ₂	✓		nitrogen	N ₂	✓		carbon dioxide	CO ₂		✓	silicon dioxide	SiO ₂		✓	2	oxygen and nitrogen both elements (1). carbon dioxide and silicon dioxide both compounds (1).
chemicals	formula	element	compound																						
oxygen	O ₂	✓																							
nitrogen	N ₂	✓																							
carbon dioxide	CO ₂		✓																						
silicon dioxide	SiO ₂		✓																						

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Question			Answer	Mark	Guidance
	c	i	<div> <div>type of bonding</div> <div> <div>ionic</div> <div>covalent</div> <div>metallic</div> </div> <div> <div>structure</div> <div>atoms held together in a lattice</div> <div>small molecules</div> <div>ions with opposite charges attracted to each other</div> </div> </div> <div>oxygen</div>	1	
		ii	<div> <div>type of bonding</div> <div> <div>ionic</div> <div>covalent</div> <div>metallic</div> </div> <div> <div>structure</div> <div>atoms held together in a lattice</div> <div>small molecules</div> <div>ions with opposite charges attracted to each other</div> </div> </div> <div>silicon dioxide</div>	1	
		iii	<div>High</div> <div>Hard</div> <div>Poor</div> <div>Does not dissolve</div>	2	all four correct = 2 marks 2/ 3 correct = 1 mark 1 correct = 0 marks
Total				[9]	

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Question			Answer	Mark	Guidance
6	a		<p>any three from:</p> <p>(ions) attracted to electrodes/ (ions) move positive (ions) or lead (ions) (attracted to) negative electrode;</p> <p>negative (ions) or bromide (ions) (attracted to) positive electrode;</p> <p>correct observations at electrodes</p>	3	<p>links movement to correct charges for (2) e.g. positive ions attracted to the negative electrode scores (2)</p> <p>do not allow atoms in place of ions</p> <p>not bromine in place of bromide</p> <p>allow correct descriptions of oxidation/ reduction</p> <p>ignore lead and bromine join/ attract together</p> <p>ignore lead/ positive ions attract to the bromide/ negative ions</p>
	b		Bromine (1)	1	
			Total	[4]	
			Paper Total	[42]	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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