



GCSE

Chemistry A

General Certificate of Secondary Education

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

Mark Scheme for June 2011

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.

© OCR 2011

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

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	The regular arrangement of ions ... <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> The ions move around the water. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2			
	d	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> state symbol <input type="checkbox"/> (s) <input type="checkbox"/> (l) <input type="checkbox"/> (g) </td> <td style="width: 50%; text-align: center;"> formula <input type="checkbox"/> B_2 <input type="checkbox"/> BR_2 <input type="checkbox"/> Be_2 <input type="checkbox"/> Br_2 </td> </tr> </table> <p style="text-align: center;">bromine liquid</p>	state symbol <input type="checkbox"/> (s) <input type="checkbox"/> (l) <input type="checkbox"/> (g)	formula <input type="checkbox"/> B_2 <input type="checkbox"/> BR_2 <input type="checkbox"/> Be_2 <input type="checkbox"/> Br_2	2	1 mark for the correct line on each side. any additional line scores 0 for that 'side'.
state symbol <input type="checkbox"/> (s) <input type="checkbox"/> (l) <input type="checkbox"/> (g)	formula <input type="checkbox"/> B_2 <input type="checkbox"/> BR_2 <input type="checkbox"/> Be_2 <input type="checkbox"/> Br_2					
	e	sodium bromide (1)	1			
		Total	[8]			

Question		Answers	Mark	Guidance
2	a	Cs; 55;	1	both correct for one mark.
	b	any four from: <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	Ignore lithium has a lower atomic number (in the question) If numbers for protons, electrons, neutrons or shells are given, they must be correct allow correct “dot and cross” diagrams for both atoms If no other marks are scored , allow (1) only for... they contain different numbers of protons / electrons / neutrons /atomic masses;

A322/01

Mark Scheme

June 2011

Question			Answers	Mark	Guidance
	c		<p>The colour of the flame.</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	1	
			Total	[6]	

3	a		potassium sulfate/ potassium sulphate (1)	1	
	b		NaNO_3 and K_3PO_4 (1)	1	both needed for one mark.
	c	i	H^+ (1)	1	
		ii	$\text{Ca}(\text{OH})_2$ (1)	1	
	d	i	A D E B C	2	A D first for one mark. all correct for two marks
		ii	<p>titration</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p>	1	
			Total	[7]	

Question	Answer	Mark	Guidance
4 a	<p>starts fast and slows down</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	1	
b	<p>any two from:</p> <p>use more concentrated acid; use smaller pieces of calcium carbonate; use a higher temperature.</p>	2	<p>accept use a catalyst</p> <p>ignore "change" temperature/ calcium carbonate etc</p> <p>allow increase surface area</p> <p>allow "stronger" acid</p> <p>ignore just "high" temperature or concentration (should be a comparison)</p>
c	<p>any two from:</p> <p>add UI solution / dip paper in; look at colour / compare to chart.</p>	2	<p>accept acid turns UI red / orange</p> <p>do not accept incorrect colour changes</p>
d	<p>→ calcium chloride (1) + carbon dioxide (1) H_2O (1)</p>	3	<p>allow the carbon dioxide and calcium chloride either way round</p> <p>not superscript numbers, and numbers need to be visibly smaller than the letters</p>
	<p style="text-align: right;">Total</p>	[8]	

Question		Expected Answers			Marks	Additional Guidance																			
5	a	17 (1)			1																				
	ii	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <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> </tbody> </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	<p>all 4 correct = 2 marks 2 / 3 correct = 1 mark 1 correct = 0 marks</p>				
	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	✓																								
	<table border="1"> <thead> <tr> <th>chemicals</th> <th>formula</th> <th>element</th> <th>compound</th> </tr> </thead> <tbody> <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> </tbody> </table>			chemicals	formula	element	compound	oxygen	O ₂	✓		nitrogen	N ₂	✓		carbon dioxide	CO ₂		✓	silicon dioxide	SiO ₂		✓	2	<p>oxygen and nitrogen both elements (1). carbon dioxide and silicon dioxide both compounds (1).</p>
chemicals	formula	element	compound																						
oxygen	O ₂	✓																							
nitrogen	N ₂	✓																							
carbon dioxide	CO ₂		✓																						
silicon dioxide	SiO ₂		✓																						

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

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

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office: 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity



OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553