OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

Unit **A322/02**: Modules C4, C5, C6 (Higher Tier)

Mark Scheme for June 2012

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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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Annotations

Used in the detailed Mark Scheme:

Annotation	**Meaning**
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response
	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third <u>and</u> fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

c. The list principle:
If a list of responses greater than the number requested is given, 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, e.g. 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.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

e. For answers marked by levels of response:
   i. **Read through the whole answer from start to finish**
   ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
   iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

   iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

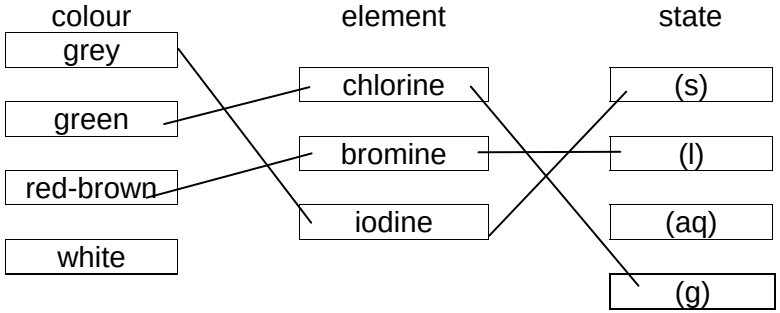
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

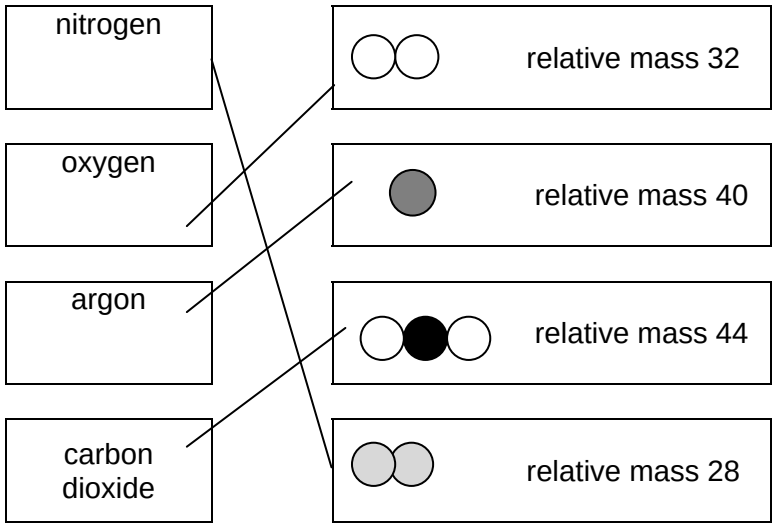
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>any three from:
trends:
melting points decrease down the group / table; (1)
boiling points decrease down the group / table ; (1)
melting point decreases/increases as boiling point decreases/increases; (1)
similarities:
formulae of the hydroxides; (1)
melting points are all low (for metals); (1)
boiling points are all low (for metals); (1)
densities are all low (for metals); (1)</td><td>3</td><td>accept ... increase up .... instead of ... decrease down ...

ignore references to density

ignore references to similar m.p, b.p or density</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>density;
sodium is too high / potassium too low ;</td><td>2</td><td>accept no trend in formulae (all the same) for [1]
not just goes up then down as you go down the group
look for evidence related to density from table for the second mark</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><th></th><th>true(✓)</th><th>false(✓)</th></tr><tr><td>caesium is more reactive than sodium</td><td>✓</td><td></td></tr><tr><td>caesium is a non-metal</td><td></td><td>✓</td></tr><tr><td>an atom of caesium has one electron in its outer shell</td><td>✓</td><td></td></tr><tr><td>caesium has fewer protons than lithium</td><td></td><td>✓</td></tr><tr><td>caesium reacts with water to make hydrogen gas</td><td>✓</td><td></td></tr></table></td><td>2</td><td>all correct = 2
3 or 4 correct = 1
1or 2 correct = 0</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>CsOH</td><td>1</td><td>look for correct answer with correct use of capitals and lower case (no more than half height of capital)
i.e. do not allow CSOH, CsoH ....</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
2	(a)	(i)	**B** and **E**	1	both needed
		(ii)	**A** and **C**	1	both needed
		(iii)	**D**	1	
	(b)		+1	1	**look for** the sign as well as the value **accept** 1+, 1^+
			Total	**4**	

Question			Answer	Marks	Guidance
3	(a)			2	LHS correct = 1 RHS correct = 1
	(b)		$2Na + Cl_2 \rightarrow 2NaCl$	2	$Na + Cl_2 \rightarrow NaCl$ for [1] **ignore** state symbols
			Total	**4**	

Question			Answer	Marks	Guidance
4	(a)			2	all four correct = 2 2 or 3 correct = 1 1 correct = 0
	(b)		<table><tr><td>All the gases in the air are elements.</td><td></td></tr><tr><td>Air contains only non-metal elements.</td><td>✓</td></tr><tr><td>There are weak attractions between molecules in the air.</td><td>✓</td></tr><tr><td>All the gases have high melting points and boiling points.</td><td></td></tr><tr><td>The gases are good conductors of electricity.</td><td></td></tr></table>	2	one per correct tick

Question			Answer	Marks	Guidance
	(c)		<table><tr><td>A covalent bond is made by sharing electrons.</td><td>✓</td></tr><tr><td>The atoms gain positive or negative charges when the bond is made.</td><td></td></tr><tr><td>The atoms are held together by the attractions between the nuclei of the atoms and the electrons between them.</td><td>✓</td></tr><tr><td>Each atom is surrounded by a sea of electrons that can move.</td><td></td></tr><tr><td>The atoms are bonded covalently into large, 3D structures.</td><td></td></tr></table>	2	
			Total	**6**	

Question			Answer	Marks	Guidance
5			ethanol/fuel puts carbon in the air by <u>combustion</u>; carbon from air into sugar (cane) by <u>photosynthesis</u>; carbon in sugar cane to ethanol/fuel by <u>fermentation</u>;	3	**accept** carbon dioxide for carbon in air **not** carbon dioxide in sugar / ethanol **ignore** respiration, carbon from fermentation to air **not** plants for sugar cane
			Total	**3**	

Question			Answer	Marks	Guidance
6	(a)		relative formula mass PbO = 223 (1) mass of lead that can be extracted from 446g lead oxide = 414 (2)	3	 if 414 is not given as final answer, **allow** [1] for 207 in working of second part of answer
	(b)		<table><tr><td>Too much carbon would be needed.</td><td></td></tr><tr><td>Aluminium oxide contains more oxygen than other metal oxides.</td><td></td></tr><tr><td>Aluminium is a very reactive metal.</td><td>✓</td></tr><tr><td>Aluminium oxide has a very high melting point.</td><td></td></tr></table>	1	
			Total	**4**	

Question			Answer	Marks	Guidance
7	(a)		hydrochloric acid; water and H_2O;	2	**not** hydrogen chloride, **accept** phonetic spelling **accept** (di)hydrogen oxide for water look for correct capitals and subscripts for H_2O subscript is at most half height of capital
	(b)		copper hydroxide, copper oxide	1	both needed
	(c)	(i)	5g	1	
		(ii)	70 (%)	1	no ecf
			Total	**5**	

Question			Answer	Marks	Guidance
8	(a)		put (sulfuric) acid into a burette; add indicator to the flask / (potassium) hydroxide; slowly / dropwise add (sulfuric) acid; until the indicator changes colour;	4	**accept** pH meter / UI / phenolphthalein / methyl orange for indicator **not** just until neutral (unless pH meter used) **accept** any specific colour change e.g. blue to green
	(b)		second row: 40 fourth row: 60	2	**allow** 60.15 / 60.2
	(c)		$H^+ + OH^-$ (1) → H_2O (1)	2	left hand side of arrow correct in either order for [1] right hand side correct for [1] look for clear and unambiguous choice of symbols from list to award the marks
			Total	**8**	

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