OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

Unit **A172/01:** Modules C4, C5, C6 (Foundation Tier)

Mark Scheme for June 2013

Oxford Cambridge and RSA Examinations

A172/01 Mark Scheme

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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.

1. **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:

	correct response
	incorrect response
BOD	benefit of doubt
NBOD	no benefit of doubt
ECF	error carried forward
0 , L1 , L2 , L3	indicate level awarded for a question marked by level of response
^	information omitted
CON	contradiction

R	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

2. **ADDITIONAL OBJ ECTS:** You **must** assess and annotate the additional object s for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

3. 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 should be blank (or have indication of choice crossed out).

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

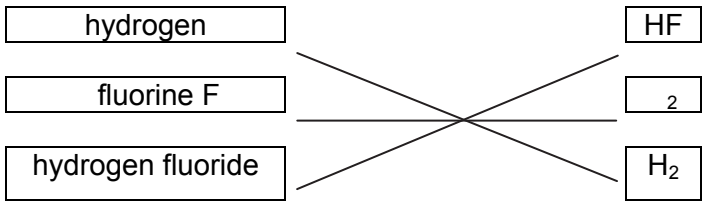
e. For answers marked by levels of response:
i. **Read through the whole answer from start to finish**
ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
iii. **To determine the mark within the level**, consider the following:

Descriptor Aw	ard 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.

Question	Answer	Marks	Guidance
1 (a)		2	all correct = 2 1 or 2 correct = 1
(b)	hydrogen + chlorine → hydrogen chloride	2	LHS correct (1) RHS correct (1) Allow correct symbols for all chemicals; balancing not necessary e.g. Cl_2 not Cl
(c)	HI	1	
(d) (i)	less reactive (down the group)	1	**ignore** not as strong **allow** the reactions take longer/ get slower **allow** more heat needed to cause a reaction
(ii)	hydrogen reacts with bromine when it is heated	1	
	Total	**7**	

Question Answer				Marks	Guidance
2 (a)			hydrogen (1) sodium hydroxide (1)	2	
(b)			add UI or pH paper/solution (1) goes blue/purple/check the colours against a reference idea/gives pH above 7(1) **OR** pH probe (1) gives pH above 7 (1)	2	If no other indicator given then accept Litmus (goes blue) for 1 mark only
(c)			the two reactions have different rates the two reactions make different alkalis	1	**both** needed
(d)			sodium and potassium are hazardous to handle	1	
			Total	**6**	

Question	Answer	Marks	Guidance
3 (a)	getting more data/information (1) checking Alex's results/peer assessment/comparing results/ idea that other people may or may not agree/if others agree it is more likely that he is right (1)	2	

Question			Answer	Marks	Guidance
3	(b)		**Level 3 (5–6 marks)** Explains points linked to support and a point linked to lack of support for Alex's idea OR a point linked to support and points linked to lack of support for Alex's idea. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Identifies a point linked to support AND a point linked to lack of support for Alex's idea. Points may be identified by person's name only. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Identifies a point linked to support or lack of support for Alex's idea. Points may be identified by person's name only. Links may not be emphatically stated. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Points that support Alex's Ideas** • K and Rb give purple flames (Bea)/two people have got the same colours for K and Rb (Alex and Bea) • Cs also gives a purple flame (Bea)/Cs is also in Group 1 • Group 2 elements don't give purple flames (Carl) • No other elements except group 1 have purple flames (Elly) • Bea/Elly/(partly) Carl support Alex's ideas (insufficient at level 3) **Points that do not support Alex's ideas** • Na gives a yellow flame/not a purple flame/ Na is in group 1 (Dan) • Li does not give a purple flame (Fay)/ Li is in group 1 • Elements in Group 2 all have different coloured flames (Carl) • Fay/Dan/(partly) Carl do not support Alex (insufficient at level 3) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**8**	

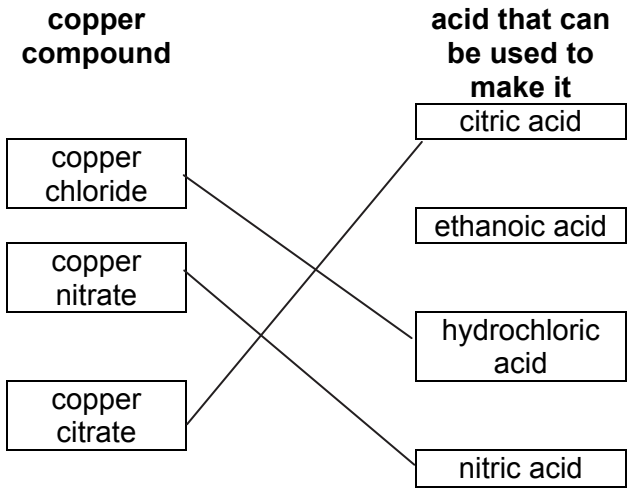
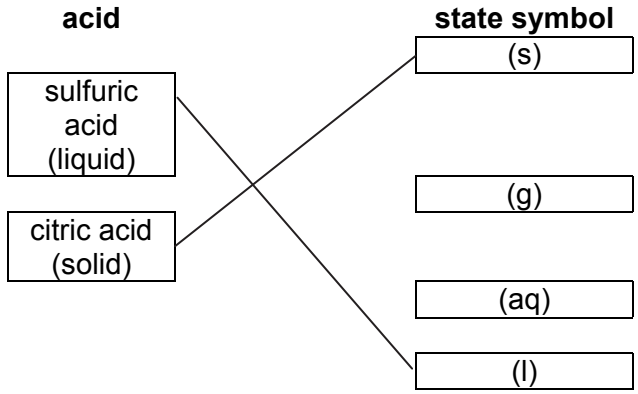
Question	Answer	Marks	Guidance
4 (a)	(water containing calcium ions) gives a <u>white</u> precipitate (1) which does not re-dissolve/ doesn't dissolve (1) pure water does not give a precipitate/no change (1)	3	
(b) (i)	volume/amount of water/temperature of water/type of soap/concentration of soap solution/drop size	1	Apply list principle **ignore** references to time

Question	Answer	Marks	Guidance
4 (b) (ii)	**Level 3 (5–6 marks)** Makes a comparison that links cities with concentration/ amount of calcium ions OR makes a comparison that links the concentration of calcium ions to how much soap is needed. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Makes a simple conclusion. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Selects information from the table. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to E** **Indicative scientific points may include:** **Makes <u>comparisons</u>** • The higher the concentration of calcium ions the more soap needed. • London water contains **more** calcium ions • Birmingham does not contain as many calcium ions as London/more than Plymouth. • Plymouth water contains few calcium ions (**allow** no calcium ions) **Makes simple <u>conclusions</u>** • Water with calcium ions needs a lot of soap to make a lather • Pure water needs a little soap to make a lather • Birmingham/London need a lot of soap to make a lather • Plymouth water only needs a small amount of soap. • Different waters need different amounts of soap. • London water needs similar amount of soap to water that contains calcium ions **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**10**	

<table>
<tr><th colspan="3">Question Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5 (a)</td><td></td><td></td><td>3</td><td>all correct = 3
3 correct = 2
2 correct = 1
1 correct = 0</td></tr>
<tr><td>(b)</td><td></td><td></td><td>carbon dioxide is found in the atmosphere, silicon dioxide is found in the lithosphere</td><td>1</td><td></td></tr>
<tr><td>(c)</td><td></td><td></td><td>carbon monoxide  (1)
oxygen (1)</td><td>2</td><td>atoms are touching/clearly joined together in both molecules</td></tr>
<tr><td></td><td></td><td>Total</td><td></td><td>6</td><td></td></tr>
</table>

only	true for carbon dioxide (✓)	only true for silicon dioxide (✓)	true for both (✓)
contains ... in each	✓		
... giant structure		✓	
.. covalent bonds			✓
.. gas ...	✓		

Question Answer				Marks	Guidance
6 (a)			12% (2) shows working that adds up 47+28+8+5 (1)	2	Look at table for 12% if not on the line
(b)			(both) contain oxygen/ silicon/aluminium/iron/ other elements (1) Refers to correct percentages/amounts (1)	2	Any mention of copper = 0 marks for first marking point **allow** they have similar percentages of "other elements" for two marks **allow** highest percentage in both is oxygen for two marks
(c)			site B because it contains more (different) metals idea (1) site B contains more aluminium/iron/copper than site 1 (1)	2	ORA Candidate should give specific name(s) of metal(s) Chooses site A = 0
			Total	**6**	

Question	Answer	Marks	Guidance
7 (a)	copper oxide (1) copper carbonate (1)	2	
(b)		2	all correct = 2 1 or 2 correct = 1
(c)		1	
	Total	**5**	

Question			Answer	Marks	Guidance
8	(a)		**first mark (one of):** all the compounds have different/higher/greater/bigger (relative formula) masses going down the group ; the mass increases by 16 as you go down the group ; each has a different **metal** (atom) ; lithium chloride has the lowest/potassium chloride has the highest **second mark (one of):** the (relative atomic) masses of lithium, sodium and potassium are all different ; there are different numbers of protons and neutrons in each (metal)	2	
	(b)	**(i)**	19	1	
		(ii)	26	1	allow ecf from 8(b)(i)
			Total	**4**	

Question	Answer	Marks	Guidance
9 (a)	**Level 3 (5–6 marks)** Explains what exothermic and endothermic mean in terms of energy being released/absorbed **AND** links each diagram to the correct energy change **AND** explains how to use the diagrams to decide. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Explains what exothermic **OR** endothermic means **AND** links each diagram to the correct energy change **OR** identifies the diagrams correctly **AND** explains how to use the diagram to decide. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Either explains what exothermic or endothermic means **OR** links one of the diagrams to the correct energy change **OR** makes a correct statement about energy level diagrams. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **How to use diagrams to decide** • Energy change goes up for endothermic reactions/energy change is positive • Energy change goes down for exothermic reactions/energy change is negative • Reactants lower than products for endothermic reactions • Reactants higher than products for exothermic reactions. **Which is which** • Lithium chloride reaction is exothermic/gives out energy • Potassium chloride reaction is endothermic/takes in energy. **What exothermic and endothermic mean** • Exothermic gives energy/heat out or is losing energy • Endothermic takes energy/heat in or is gaining energy **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
(b)	energy changes in reactions affect the rate (1) containers for reactions may be damaged by extreme temperatures (1)	2	
	Total	**8**	

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