OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

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

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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
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.

Question			Answer	Mark	Guidance
1	(a)		less reactive (down the group)	1	
	(b)	(i)	iodine/astatine/other elements are less reactive/ takes longer to react (than bromine) iodine is more reactive than astatine ora;	2	**allow** "astatine will not react" **allow** "astatine and iodine are less reactive" for 1 mark **allow** "astatine is least reactive" for 1 mark **ignore** comments about flames
		(ii)	no (no mark) *any two from*: group 1 shows the exact opposite pattern/Lithium (is at the top of the group) is the least reactive ORA (1) no other groups were tested (1) reactivity for alkali metals increases going down the group (1)	2	
			Total	**5**	

Question			Answer	Mark	Guidance
2	(a)		**[Level 3]** Makes points about different properties of Gp1 and Gp 7 and identifies L3 points that do not support Mendeleev. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Makes points about <u>different</u> properties for Gp1 and Gp 7. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Makes points about the same property for Gp 1 and Gp 7 OR makes points about different properties for one group. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Points about Gp 1** Group 1 / Li, Na, K….. • are all shiny / solids / similar appearance • all conduct electricity • MPts/BPts show a trend in Gp 1 / MPts/BPts decrease down Gp 1 / MPts/BPts for Gp 1 are generally high(er) / BPts have a large(r) range / (**ignore** references to MPt range) **Points about Gp 7** Group 7 / Cl, Br, I….. • do not conduct electricity • all coloured • states/colours/appearance of Gp 7 are different • MPts/BPts show a trend in Gp 7 / MPts/BPts increase down Gp 7 / MPts/BPts for Gp 7 are generally low(er)/ BPts have a small(er) range / (**ignore** references to MPt range) **Does not support Mendeleev** • iodine's MPt is …. high for Gp 7/higher than Na/K/ high compared to Gp 1 / similar to Gp 1 / links iodine is a solid to group 1 • Li has an unusually high BPt for Gp 1 **ignore** discussion of any properties not from the table e.g. atomic structure / reactivity (at rtp) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

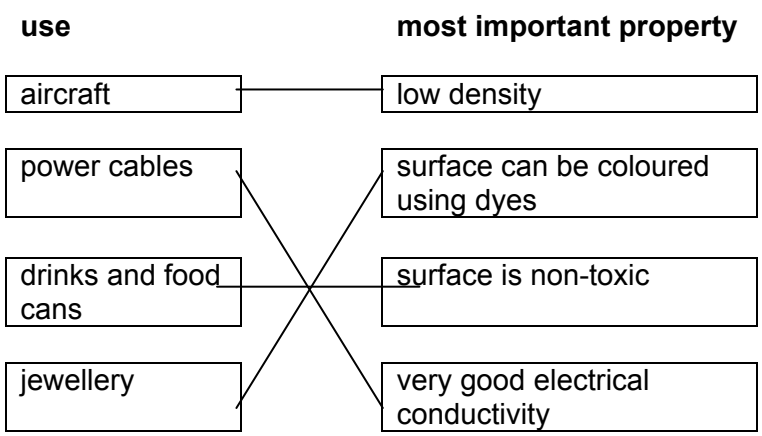
Question			Answer	Mark	Guidance
3	(a)		2,7	1	
	(b)		arrangement 2, 8, 1	1	
	(c)		chlorine	1	
	(d)		protons and neutrons	1	both needed, either order **accept** phonetic spelling **ignore** 'nucleons'
			Total	**4**	

Question			Answer	Mark	Guidance
4	(a)	(i)	sodium + chlorine → sodium chloride LHS (1) RHS (1)	2	**accep**t correct symbol equations in place of word equations
		(ii)	use fume cupboard because it's toxic;	2	**ignore** goggles, lab coats etc
	(b)		<table><tr><th></th><th>**true** (✓)</th><th>**false** (✓)</th></tr><tr><td>Potassium chloride gives a coloured flame in a flame test.</td><td>✓</td><td></td></tr><tr><td>Potassium chloride is a gas.</td><td></td><td>✓</td></tr><tr><td>Potassium chloride can be made by reacting potassium with bromine.</td><td></td><td>✓</td></tr><tr><td>Solid potassium chloride contains sodium ions and chloride ions.</td><td></td><td>✓</td></tr></table>	2	all correct = 2 2/3 correct = 1 1 correct = 0
			Total	**6**	

Question			Answer	Mark	Guidance
5	(a)		**[Level 3]** Some points from test 1 AND/OR test 2, AND a higher level marking point. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Some points from test 1 AND/OR test 2. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** At least one point from test 1 OR from test 2. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **(Test) with sodium hydroxide/test 1** • sodium hydroxide solution can be used to test for both calcium and zinc (ions) • different volumes of sodium hydroxide are needed to distinguish between calcium and zinc ions OWTTE • both Amy's test and Zak's test gave a white precipitate (with sodium hydroxide) • the test gives a white precipitate at first/ with a few drops of sodium hydroxide (Zak)/with calcium ions • the test gives a white precipitate at first/ with a few drops of sodium hydroxide (Amy)/with zinc ions **(Test) with acidified silver nitrate/ test 2** • acidified silver nitrate can be used to test for chloride ions • both Amy's test and Zak's test gave a white precipitate • test 2 gives a white precipitate showing chloride ions **High level points could include:** • Zak is right/zinc chloride is the compound/ zinc and chloride ions are present • with excess/more sodium hydroxide/ Zak's test, the white precipitate re-dissolves/ dissolves because the ions are zinc **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
6	(a)	(i)	Ar Pb= 207 Ar O = 16	1	both needed
		(ii)	223	1	**allow** ecf, total of two numbers given in (a)(i)
	(b)	(i)	disadvantages: eyesore (from waste rock) / noise / traffic / possible toxicity / dust / subsidence; advantages: work / jobs / improved transport links / more facilities available;	2	**ignore** wildlife/habitat/environment/pollution/danger/hazard ideas
		(ii)	idea that it cannot be made completely safe / benefits outweigh risks; need lead for building materials / people need the jobs / boosts local economy;	2	**allow** other correct uses of lead
			Total	**6**	

Question			Answer	Mark	Guidance
7	(a)		The aluminium oxide loses oxygen. ✓	1	
	(b)	(i)	liquid; ionic	2	
		(ii)	**electrode** **product made** positive electrode → oxygen negative electrode → aluminium aluminium aluminium oxide chlorine hydrogen oxygen	2	two lines from any box = 0 for that box

Question			Answer	Mark	Guidance
	(c)			2	all correct = 2 2/3 correct = 1 1 correct = 0 **allow** jewellery also connected to 'surface is non-toxic'
			Total	**7**	

Question			Answer	Mark	Guidance
8	(a)		hydrochloric acid; water and H_2O;	2	**ignore** hydrogen chloride **do not allow** H^2O / H2O O must be at least half the height of H
	(b)		copper oxide and copper hydroxide;	1	need both
	(c)		**[Level 3]** Gives a method to produce crystals in the correct sequence, with a point of explanation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Gives some points about method OR explanation OR sequence. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Gives a point about method OR explanation OR sequence. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to E** **Points about method may include** • use a filter • heat the solution • leave the solution **Points about explanation may include** • (use a filter) to remove solid copper carbonate • (heat the solution) to evaporate (some of the water) • (leave the solution) to make crystals • (wash the crystals) to get rid of remaining impurities • (use a dessicator) to produce dry crystals **Points about the sequence may include** • filter is used a the start • heating (after filtering) • leaving to crystallise after heating **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	(d)	(i)	4.5	1	
		(ii)	90	1	**allow** ecf from **(d)(i)**
			Total	**11**	

Question			Answer	Mark	Guidance
9	(a)		**chemical** **formula** hydrogen → H_2SO_4 zinc → Zn sulfuric acid → H_2	2	all correct = 2 1 or 2 correct = 1
	(b)		zinc sulfate	1	
	(c)		increase temperature/heating; use smaller pieces of zinc / increase surface area; more concentrated acid;	2	**accept** 'use a catalyst' **ignore** "more acid" **ignore** "stronger acid" **ignore** "use less dilute acid"
	(d)	(i)	The reaction rate is at its fastest. ☐ ✓ ☐ ☐	1	
		(ii)	The reaction has stopped. ✓ ☐ ☐ ☐	1	

Question			Answer	Mark	Guidance
	(e)		acid at the start; (acid) used up	2	**accept** 'acid is neutralised' = 2 "it becomes neutral" = 1 **ignore** "it becomes more alkaline"
			Total	**9**	

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