OCR
Oxford Cambridge and RSA

GCSE

Chemistry A

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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

L1 , L2 , L3	draw attention to particular part of candidate's response
^	information omitted

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^	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:

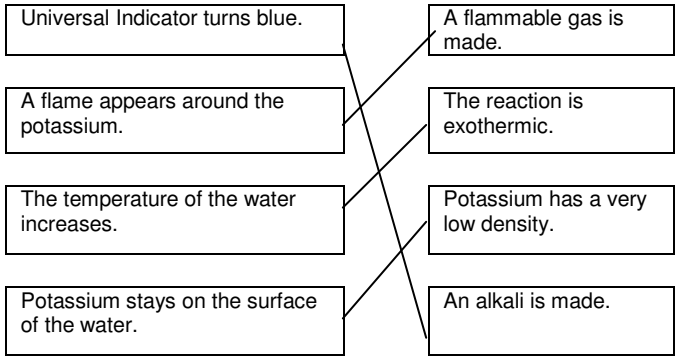
i. **Read through the whole answer from start to finish**
ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
iii. **To determine the mark within the level**, consider the following:

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	Marks	Guidance
1					
	a		more reactive down the group; (1) (more reactive metal) finishes quicker/takes less time; (1)	2	**Allow** Li is the least reactive / K is the most reactive / more protons/higher RAM are more reactive **Allow** K is quicker than Li/the bottom one is quickest/ more protons/higher RAM the faster the reaction
	b			2	All correct = 2 3 or 2 correct = 1
	c		oxygen	1	
				5	

Question			Answer	Marks	Guidance
2					
	a		Gases are toxic/idea of taking gases away/must not breathe in;	**1**	**Allow** vapours / 'fumes' for gases **Allow** harmful/corrosive/dangerous for toxic **Ignore** flammable Gases/fumes/hazards MUST be qualified
	b	i	chloride	**1**	Do not accept 'chlorine'
		ii	displacement	**1**	

Question	Answer	Marks	Guidance
c	**[Level 3]** Links some colour changes to a correct product and a reaction. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Gives correct product for some colour changes OR links one colour change to a correct product and a reaction. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Gives correct product for a colour change OR reference to a reaction 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** **Indicative scientific points may include:** **Reason for colour changes** • KCl green because of chlorine made • KBr orange-brown because of bromine made • KI grey solid because of iodine made **Reaction** • Reactions happen /fluorine reacts idea • Displacement happens • (Chlorine/bromine/iodine) produced • Fluorine is at the top of Group 7 • Fluorine is very reactive • Fluorine is more reactive than the other elements • Reactivity decreases down the group **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**9**	

Question			Answer	Marks	Guidance
3	a		Scientist 2 and scientist 5; (1) Scientist 2 is evaluating/judging/analysing /criticising Mendeleev's work;(1) Scientist 5 is checking/repeating another scientist's work/checking results/look for repeatability; (1)	3	 **Ignore** 'reviewing' (in the Q) **Allow** 'give feedback' **Ignore** 'talking about' 'discussing' (not enough) **Allow** 'do the same experiment' / 'repeat the experiment'
	b		**2 from** Mendeleev: left gaps for undiscovered elements / made predictions about properties; Scientists: Idea of fitting/matching (in the gaps); <u>Idea that properties</u> of new elements agree with or support Mendeleev's predictions;	2	 **Ignore** 'goes in the gaps' (in the Q) **Allow** example of a property that matched
				5	

Question			Answer	Marks	Guidance
4	a		box 4; box5;	1	BOTH required for 1 mark
	b		lithosphere	1	
	c		limestone means water (ORA); (1) water is evidence for life; (1)	2	**Allow** looking for water/looking for absence of water **Ignore** limestone only forms in large amount of water **Must be in context of water** **Ignore** allows people to live there
				4	

Question			Answer	Marks	Guidance
5	a		gas; (1) O_2; (1)	2	**Reject** O/O^2/O2
	b		box 3	1	
	c		Does not support and identifies water as the anomaly; Water is below 100/water has RFM of 18; Water is a liquid;	3	If no other mark awarded: **allow** some support and some don't for 1 mark
				6	

Question			Answer	Marks	Guidance
6	a		The copper oxide loses oxygen / box 2	1	
	b	I	box 1; box 3 box 4;	2	All 3 correct = (2) 2 correct and only 3 ticks shown = (1)
		ii	any 2 from: jobs/ income; use of metals for products / example of metal use (e.g. cars/fridges etc); idea of local economy; idea of national economy; advantage of large scale: transport links to one area / control of waste is in one area / economy of scale idea /more efficient or more economic to extract on a large scale / lower energy costs on a large scale / large scale can use continuous not batch processes;	2	**Ignore** 'to meet demand' or 'need metals' or 'use a lot of metals' alone (not enough) **Allow** mark for 'economy' alone MP5 must be linked to idea of large scale extraction

Question	Answer	Marks	Guidance
c	**[Level 3]** Links **reactivity** with the **method used** and to **energy**. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Makes a link between trends. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Makes a correct statement about the data. 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:** **Level 3: (Links reactivity and method and energy)** • More reactive metals use electrolysis which uses high energy / the more reactive a metal the more energy is needed and electrolysis is used • Less reactive metals use extraction with carbon which uses less energy / the less reactive a metal the less energy is needed and heating with carbon is used **Level 2: (Link between trends)** • Links reactivity to method of extraction • Links reactivity to temperature needed • Links reactivity to energy needed • Links temperature needed to method of extraction • Links temperature to energy • Links method used to energy **Level 1: (data)** • Ca/Mg/Al are most reactive metals • Zn/ Fe/ Pb/Cu are less reactive metals • Ca/Mg/Al need a high temperature (for extraction) • Zn/ Fe/ Pb/Cu need a lower temperature (for extraction) • Ca/Mg/Al use electrolysis • Zn/ Fe/ Pb/Cu use heating with carbon • Mg/Al does not fit the trend **Ignore** references to melting point **Statements** about one metal alone indicate level 1
	Total	**11**	

Question			Answer	Marks	Guidance
7	a		sulfuric acid; (1) H_2O;(1)	2	**Accept** hydrogen sulfate
	b	i	3.2(g); (1)	1	Accept 3.2 alone
		ii	1600 g / 1.6 kg; (2) Uses 1000 in calculation / 1000 g = 1 kg / 1.6 or 1600 with no units or incorrect units (1)	2	Answer with units (2) **Allow ecf** for incorrect answer to b (i)
		iii	Box 1; (1) Box 4;(1)	2	
				7	

Question			Answer	Marks	Guidance
8	a		box 2 and box 4 (need both)	1	
	b		7	1	
	c		box1; (1)	1	
	d		faster reaction / rate increases / decreases time for reaction;(1) due to increased surface area; (1)	2	**Ignore** speed of dissolving/spreading/diffusing
				5	

Question			Answer	Marks	Guidance
9	a		Any two from: Shorter times mean faster reaction; at higher temperatures times are shorter; at higher temperature reaction is faster;	2	

Question	Answer	Marks	Guidance
b	**[Level 3]** Makes correct judgements for Joe and Eve **AND** justifies these using appropriate evidence from the data for both judgements Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Makes correct judgements for Joe and Eve **OR** justifies a correct judgement using appropriate evidence from the data. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Makes a correct judgement for Joe or Eve but may not link this clearly to data **OR** shows how data links to rate. 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** **Indicative scientific points may include:** **Joe** • Joe is correct • Group 1 times same as one with no catalyst • Group 1 and no catalyst times are all 45s • Na^+/K^+ times are the same as no catalyst **Eve** • Eve is not correct • Fe^{3+} is not fastest/takes longer than Co^{2+} • Evidence: Mentions data for ions with +1, +2 and +3 charges. **How data links to rate** • Times are lower if rate is faster • Same times = same rate **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**8**	

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