OCR
Oxford Cambridge and RSA

GCSE

Chemistry A

Unit **A171/02**: Modules C1, C2, C3 (Higher 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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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:

BP	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	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

ADDITIONAL OBJECTS: You **must** assess and annotate the additional objects 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.

1. 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. 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**

d. 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	i	<table><tr><th>true</th><th>false</th></tr><tr><td>√</td><td></td></tr><tr><td>√</td><td></td></tr><tr><td></td><td>√</td></tr><tr><td></td><td>√</td></tr></table>	2	All 4 ticks correct = 2 marks 3 or 2 correct = 1 marks
		ii	Mean is calculated as 300;	1	
		iii	Mean is drawn at 300;(1) Maximum is drawn at 500; (1)	2	ecf
		iv	Chart/solid particles show upward trend; (1) Any 2 from: idea of fluctuation from day to day / up and down; changes in pollution should be examined over periods much longer than 12 or 13 days / it's only 12 or 13 days; chart only shows evidence on solid particles / no evidence for other pollutants;	3	**allow:** solid particles are increasing **ignore:** pollution is increasing (stem of question) **ignore:** more results needed / data is not enough
	b		<table><tr><td></td><td></td></tr><tr><td>Coal is mainly carbon atoms.</td><td>√</td></tr><tr><td></td><td></td></tr><tr><td>There is not enough oxygen .. carbon to react.</td><td>√</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table> (1) (1)	2	
			Total	**10**	

2			**[Level 3]** Compares changes in amounts of gases on Mars with the changes on Earth and states reasons for changes for two gases. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** States reasons for changes for two gases or compares changes in amounts of gases on Earth and Mars. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** States a change to the atmosphere of Mars or Earth or gives a reason how one gas has changed on Earth. 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 A/A*** **Indicative scientific points may include:** • Percentage carbon dioxide has increased on Mars. • Percentage water vapour has decreased on Mars. • Some oxygen has appeared on Mars • Percentage carbon dioxide has decreased on Earth • Percentage water vapour has decreased on Earth. • Percentage oxygen has increased on Earth. • Water vapour has disappeared from both the atmosphere of Earth and Mars by condensation or freezing. • Oceans have formed. • Carbon dioxide has disappeared from Earth because it has dissolved in oceans. • Plants have added oxygen • Plants have removed carbon dioxide from Earth's atmosphere. • Lowering of amounts of carbon dioxide has given much higher proportion of nitrogen on Earth. **accept:** atmosphere on Mars very small/thin compared to that on Earth. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

3	a		C B F D	3	puts **C** first (1) includes **B** (1) **FD** at end (1)
	b		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>It reacts with water and oxygen.</td><td>√</td></tr></table> (1)	1	
			Total	**4**	

4	a		<table><tr><td></td><td></td></tr><tr><td>Changing the surface may affect the outcome.</td><td>√</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table> (1)	1	
	b	i	150 (2) Shows '80' anywhere in working for 1 mark	2	Correct answer with no working (2) Allow 100/52 x 120 = 231 for 1 mark
		ii	First measurement could be an outlier / reliability / repeatability / checking; (1)	1	**allow** accuracy / close to the true value **allow** to calculate a mean **allow** idea of variation of results problems with controls eg wind, height etc **ignore** fair test **ignore** best estimate on its own
	c		<table><tr><td>increases</td><td>increases</td><td>increases</td></tr><tr><td>decreases</td><td>decreases</td><td>decreases</td></tr></table> (1) (1)	2	each complete row = 1 mark
			Total	**6**	

5	a		**[Level 3]** Chooses polypropene **and** uses properties to justify that choice **and** gives a reason why another material is not chosen. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Chooses polypropene **and** uses properties to justify that choice. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Chooses polypropene OR chooses any other material and justifies choice of that other material with a correct property. 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:** **Properties of polypropene:** • low stiffness • low density • floats • low water absorbency **Why another material is not chosen:** • Kevlar is dense/sinks/stiff/absorbs water • Nylon is dense/sinks/absorbs water • Polyester is dense/sinks **ignore:** flexible and light (in the stem of question) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		b	Any **two** from abundance/lots of plants / synthetic materials not available; plant material is grown locally / need of transport for synthetic materials; high cost of transport / use of energy to transport materials;	2	
			Total	**8**	

6	a		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Larger mols….. larger forces between them.</td><td>√ (1)</td></tr><tr><td>More energy…strong forces than weak ones.</td><td>√ (1)</td></tr><tr><td></td><td></td></tr></table>	2	
	b		Any two from: Fuel or named fuel; lubricant; chemical synthesis; waxes; road surfaces;	2	Answers in any order More than 1 fuel = 1 mark **Ignore:** bitumen on its own
	c		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td>√ (1)</td></tr><tr><td></td><td></td></tr></table>	1	
			Total	**5**	
7	a		high blood pressure; (1) heart disease / heart problems / strokes; (1)	2	For 1 mark each **accept** stomach cancer;(1) **accept** kidney disease;(1) **accept** osteoporosis;(1) **ignore:** build up of fat, cholesterol,obesity
	b	i	all 4 calculations with a correct comment (2) at least 2 calculations of fall in salt content for 1 mark	2	examples of evidence of correct calculations half of 2005 double 2013 percentages correct use of </>/=
		ii	need to know about **more** cereals; (1) Idea of checking/ need to repeat / peer review ; (1)	2	
	c	i	6.0×10^{-4}	1	
		ii	nanoparticles have not been tested / may be harmful to humans / long term risks not known; (1) benefit that amount of salt eaten is lowered;(1)	2	
			Total	**9**	

<table>
<tr>
<td>8</td>
<td>a</td>
<td></td>
<td>
[Level 3]
Links angle of magnetism in a rock to where it was when it was formed and writes about the need for dating.
Quality of written communication does not impede communication of the science at this level.
(5 – 6 marks)

[Level 2]
Know that the direction of magnetism is set when the rocks form or know that the rocks must be dated.
Quality of written communication partly impedes communication of the science at this level.
(3 – 4 marks)

[Level 1]
Know that the direction of magnetism in rocks can be different.
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)
</td>
<td>6</td>
<td>
This question is targeted at grades up to A/A*

Indicative scientific points may include:
Level 1
• this direction depends on the Earth’s magnetic field
• magnetic field depends on position on earth
Level 2
• need to date when rock formed
• these are magnetised in a fixed direction once the rock has formed

Level 3
• scientists can measure the angle that the rocks are magnetised
• angle shows what latitude they were laid down
• dating of rock needed to work out movement

ignore: references to magnetic pole flipping and magnetic stripes.

Use the L1, L2, L3 annotations in Scoris; do not use ticks.
</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td></td>
<td>
<table>
<tr><td></td><td></td></tr>
<tr><td>Continents are parts of tectonic plates.</td><td>√</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Tectonic plates move</td><td>√</td></tr>
</table>
(1)

(1)
</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td><td></td><td></td>
<td>Total</td>
<td>8</td>
<td></td>
</tr>
</table>

	9	a	Any **two** from: persists in the environment / is a long term / future problem; enters water / air / soil; enters human tissue; enters food chain; idea of accumulation/building up;	2	**ignore** named health problems eg gets into blood stream / lungs / cells etc
		b	Any **two** from: toxicity not taken seriously / did not know extent of damage; no alternatives available / only way of making certain chemicals/goods at that time; people wanted the profit from selling chemicals; people needed to work to earn a living;	2	**allow** benefits outweigh risks
			Total	**4**	

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