OCR
Oxford Cambridge and RSA

GCSE

Chemistry A

Unit **A171/01**: Modules C1, C2, C3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2014

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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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.

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	Marks	Guidance
1	a	i	water	1	
		ii		1	
	b		**[Level 3]** Makes a choice and justifies this choice. Statements that discuss the amount of fuel burned **and** the amount of air pollution for cars and buses. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Makes a choice and justifies this choice. Answer gives comparison between buses and cars in terms of air pollution **or** fuel burned. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Simple statement about benefit of using a type of transport 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**: • choice of Dom, neither of both • fewer cars make less pollution/burn less fuel • if people travel on a bus rather than in cars then less fuel is burned overall/per person • one bus burns less fuel/ makes less pollution than a number of cars • faster journey by bus linked to less fuel burned/ less air pollution • cars stuck in traffic burn extra fuel /make more air pollution • air pollution increases as more fuel burned. **Simple statements:** • each bus carries more people than each car • if people travel on buses there will be fewer cars • journey time is longer in a car / shorter in a bus • some buses may not be full **Only credit these statements if qualified or linked** • more people travel by bus • bus burns more fuel • bus travels faster **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**8**	

Question			Answer	Marks	Guidance
2	a		sulfur in the coal / fuel; (1) oxygen from the air;(1)	2	**Ignore** named fuels other than coal e.g. petrol If no marks are awarded then award 1 mark for identifying sulfur and oxygen **only**.
	b	i	**any 3 from:** (it) goes down; then varies/goes up and down; comparison of goes down fast at first / comparison of goes down more slowly at the end; recognises that the amounts (of SO_2) are in millions of tonnes;	3	**Ignore** 'steady' as an alternative to variation
	c	i	a correlation	1	
		ii	**Description (1 max)** **Linked explanation (1)** use (wet) scrubbers removes SO_2 remove sulfur from fuel no SO_2 produced in burning Use low sulfur fuels less SO_2 produced in burning Precipitator plates remove SO_2 use less electricity less SO_2 produced use wind turbines no SO_2 produced	2	Description and explanation must match. **Accept** 'pollution' as an alternative for SO_2 in the explanation **Ignore** arguments based on using less fuel without qualification of using less/no sulphur **Ignore** alternative transportation arguments **unless** qualified, e.g. use low sulfur fuels in cars **Accept** any other sensible suggestion
			Total	**8**	
3	a		carbon dioxide	1	

	b		**any two from:** (Plants/trees) photosynthesised; carbon dioxide decreased ; oxygen increased;	2	**Ignore** respiration **Accept** 'plants change carbon dioxide into oxygen' for 2 marks (See guidance of list principle for this question)
			Total	**3**	

Question			Answer	Marks	Guidance
4	a	i	(6.5 + 8.2 + 6.1 + 10.2 + 9.0) / 5 (1) = 8.0 kg (1)	2	Correct answer without working = 2 marks **Accept** 8
		ii	6.1 to 10.2	1	**Accept** 10.2 to 6.1
		iii	New bag range starts lower than old bag range / New bags have a lower breaking point;	1	**Accept** 'new bags lowest value 6.1 compared to old bag value 7.4'
	b	i	higher than	1	
		ii	higher than	1	
			Total	**6**	
5	**a**	**i**	TFT	2	All correct (2) 1 or 2 correct (1)
		ii	fuel oil is 100 – (2 + 25 + 5 + 5 + 8) = 55% ; (2)	2	Correct answer of 55% scores 2 marks If final answer incorrect look at working to score max 1 mark
	b		smaller than (1) smaller than <u>and</u> less than(1)	2	
			Total	**6**	

Question			Answer	Marks	Guidance
6		a	**[Level 3]** A balanced argument based on the risks **and** benefits of socks **and** plasters Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** A balanced argument based on the risks **and** benefits of **either** socks **or** plasters. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Isolated statement(s) risks **or** benefits of **either** socks **or** plasters 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:** **Risks;** • The effects of nanoparticles have not been investigated. (Both) • Nanoparticles may enter body (Both) • Nanoparticles may get into water system when socks are washed. (S) • Long term effects of nanoparticles are not known (Both) • Potential allergies to nanoparticles (Both) **Benefits;** • Silver particles give fibres antibacterial properties (Both) • Nanoparticles in socks stop them smelling (S) • Nanoparticles in plasters keep wound free of microbes. (P) • Antibacterial properties are more effective than larger particles because of much greater surface area. (Both) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Marks	Guidance
	b		gives a named use e.g sports equipment / sun creams / car paint / stain resistant clothing (1) gives a linked property e.g. stronger rackets / spreads more easily / self repairing paint / non stick properties/ (1)	2	Must have a **different** item from plasters or socks
			Total	**8**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td><table><tr><td>Dr Abbott</td><td></td></tr><tr><td>Miss Brown</td><td>✓</td></tr><tr><td>Mr Collins</td><td></td></tr><tr><td>Professor Derry</td><td>✓</td></tr><tr><td>Mrs Evans</td><td></td></tr></table></td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><td>Dr Abbott</td><td>✓</td></tr><tr><td>Miss Brown</td><td></td></tr><tr><td>Mr Collins</td><td></td></tr><tr><td>Professor Derry</td><td></td></tr><tr><td>Mrs Evans</td><td></td></tr></table></td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>iii</td><td>Mrs Evans is right because:
Food already contains salt; (1)
Salt intake can be monitored/checked by looking at packaging (1)</td><td>2</td><td>Decision alone scores no marks</td></tr>
<tr><td></td><td></td><td>iv</td><td>flavouring</td><td>1</td><td>Accept improves taste</td></tr>
<tr><td></td><td>b</td><td>i</td><td>Any two from:

KCl mined in solution mining has greater purity / contains less impurities;
Solution mining uses less labour / more economic / less hazardous for workforce / makes less waste / eyesore;
this is more suitable for turning into other chemicals / electrolysis;</td><td>2</td><td>accept alternative wording for impurities eg grit, dirt, mud, rock
Ignore subsidence
Ignore cleaner</td></tr>
<tr><td></td><td></td><td>ii</td><td>potassium hydroxide</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
8			**[Level 3]** Description of the graph is **linked** to an explanation of action of chlorine a **and** a comment about advantages and disadvantages of adding chlorine to water (in other areas) Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Description of the graph with an attempt to link to an explanation of action of chlorine **or** a comment about advantages and disadvantages of adding chlorine to water. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Some comment about effects of chlorine **or** comment on the graph 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:** **Graph** • Graph shows reduction in disease over time after 2009 when chlorine was introduced • **Effect of chlorine (also advantages)** • chlorine added to water to kill microbes**/**diseases • disease is caused by (named) bacteria/microbes • sterilises **Advantages of chlorine** • addition of chlorine to drinking water make a major contribution to public health • chlorine makes the water safer to drink **Disadvantages of chlorine** • concentration must be controlled • may alter the taste of water • may affect pH • may kill fish • may be harmful • Chlorine can react with organic compounds • Difficult to get chlorine to remote areas in developing countries • Developing countries might not have the funds to purchase the chlorine/equipment • Some people may have an allergy to chlorine **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>9</td><td>a</td><td></td><td>chlorine</td><td>1</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td><table>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>There is an environmental impact when the product is made from PVC.</td><td>✓</td></tr>
<tr><td>The length of time the product is in use.</td><td>✓</td></tr>
</table></td><td>2</td><td></td></tr>
<tr><td></td><td>c</td><td>i</td><td>Yes target was reached because:
In 2000 – 50(thousand) tonnes PVC recycled and
In 2010 – 260(thousand) tonnes recycled ;(1)

Increase of 210 (thousand) tonnes; (1)</td><td>2</td><td>

Accept 10,000 tonnes above the target</td></tr>
<tr><td></td><td></td><td>ii</td><td>any two from
less to go in landfill;
less crude oil used / saving resources;
Less energy used/ less fuel used in process;
Fewer greenhouse gases released
Process is (more) sustainable;</td><td>2</td><td>Ignore pollution

Accept named greenhouse gases</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

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