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 2016

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.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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:

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

2. **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.

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. 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

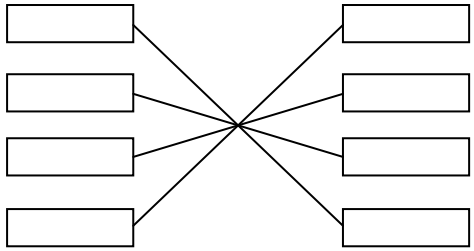
iii. **To determine the mark within the level**, consider the following:

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:

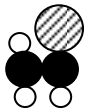
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Mark	Guidance
1	a		<table><tr><td></td><td></td></tr><tr><td>Fuels burn faster in oxygen than air.</td><td>√</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table> (1)	1	
	b		hydrocarbon	1	
	c		carbon dioxide; (1) water;(1)	2	
			Total	**4**	
2	a			3	All 4 lines correct = 3 3 or 2 lines correct = 2 1 line correct = 1

	b		**[Level 3]** Chooses petrol car **AND** Give a reason why **both** pollutants are harmful **AND** Compares data for **both** of the pollutants Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Chooses petrol car **AND** Give a reason why **both** pollutants are harmful **OR** Compares data for **both** of the pollutants **OR** Gives a reason why **one** pollutant is harmful **AND** compares data for **one** of the pollutants Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Give a reason why one pollutant is harmful **OR** compares data for **one** of the pollutants. 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 D** **Indicative scientific points may include:** Reasons for harm – nitrogen dioxide • Causes breathing problems • Possible links to asthma • Forms acid rain • Acid rain harms plants and animals Reasons for harm – carbon particulates • Causes breathing problems • Possible links to asthma • Makes things dirty Reasons for choosing petrol • diesel cars emit (3.0g/km) more nitrogen dioxide • diesel cars emit (0.5g/km) more carbon particulates • diesel emits more (of both) pollutants **Use the L1, L2, L3 annotations; do not use ticks.**
			Total	**8**	

3	a	i	'No' uses one 10 year period of correct data or identifies fluctuation in the size of increase in data (1) **and** uses a different 10 year period of correct data to compare and justify the answer (1)	2	'No' on its own is insufficient Correct data from graph that could be used: 1960-70 increase of 2000 (millions of) tons/bigger increase 1970-80 increase of 1200 (millions of) tons 1980-90 increase of 1200 (millions of) tons 1990-2000 increase of 800 (millions of) tons/smaller increase 2000-10 increase of 1300 (millions of) tons If 'yes' is given then check graph and **allow** maximum 1 mark if straight LOBF and 'yes' is justified
		ii	Value between 10000 and 11000	1	
	b	i	Any two from: General trend is upward; Fluctuation occurs (line goes up and down); Reaches a maximum of (just over) 0.7 / reaches a maximum between 2000 and 2010	2	**Allow** positive correlation **Allow** calculation of increase in temperature for first marking point
		ii	increased;(1) increased;(1) correlation;(1)	3	
			Total	**8**	

4	a		**[Level 3]** Matt's plan chosen with at least 3 features that make it the best and linked reasons for 2 of them making it the best plan. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Matt's plan chosen with 2 features **and** a linked reason for one of those features making it the chosen plan OR **3** features. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Matt's plan chosen and 1 feature or reason for this choice. 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** **Features:** Same length of ruler Same mass / same force Measure distance bends Repeats Calculates mean Ruler fixed at one end **Explanations / reasons** Control variables (**allow** fair test) Increase reliability Identify outliers Can calculate estimate of best value Safety Accuracy - fixed rather than loose ruler - linked to calculating mean **Accept reverse argument in terms of why Jane / Katya are not chosen.** **Use the L1, L2, L3 annotations; do not use ticks.**
	b	i	13 – 26 (mm)	1	Allow 13
		ii	test 3 / 13; (1)	1	
		iii	repeat test / check again / see how far away it is from the other values / see if the range is too large	1	**Ignore** 'real difference' for 'how far away it is'
		iv	(23+26+13+19+24)/5;(1) =21;(1)	2	correct answer gains 2 marks. Process of calculating a mean correctly = 1 mark
			Total	**11**	

5	a		Any correct answer property;(1) correct linked reason;(1)	2	Examples: Plastic is less dense/ lighter so easier to carry Plastic doesn't corrode/rust so lasts longer (metal not specified in question so allow 'rust' as an alternative to corrode) Plastic is a poor conductor so hot water won't burn your hands **Ignore** cost arguments I**gnore** flexibility arguments
	b	i	**Both** needed for 1 mark Material **and** use;(1)	1	**Do not allow** 'metal' as it states 'another' material in the stem of the question Material and use can be given on either line. Examples eg glass for bottles, paper for bags, leather for coats, wood for chairs etc.
		ii	2 reasons that relate to the use given in b(i); Strength / flexibility / density / resistance to corrosion / durability	2	**Do not allow** if any type of plastic or metal is named in b(i) 1 mark per reason. If an incorrect use / no use in given in b(i) then award a **maximum** of 1 mark for a sensible reason for why plastic replaces their given material.
			Total	**5**	
6	a		chlorine	1	
	b		ring around 	1	
	c	i	moves the PVC chains further apart;(1) weaker;(1) can slide over each other;(1)	3	
		ii	plasticizer may get into food /risk from eating the food; (1) (food) may be toxic/poisonous to humans / can't be easily broken down in the body (1)	2	
			Total	**7**	

7	a	i	Total energy = 3.8;(1) CO_2 made disposing of trainers = 0.6;(1)	2	
		ii	**[Level 3]** 'yes' and uses data from the table to correctly link less energy to sustainability **AND** less greenhouse gases (carbon dioxide) emitted to making the process less harmful. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** 'yes' and uses data from the table to identify less energy **and** less greenhouse gases (carbon dioxide) is emitted when producing eco trainers **OR** 'yes' and uses data from the table to correctly link less energy to sustainability **OR** less greenhouse gases (carbon dioxide) emitted to making the process less harmful. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Uses information from the diagram or use data from the table to support their answer 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:** **Use of data from the table** • eco trainers use less energy (3.8MJ energy vs 11.0MJ) compared to standard trainers. • eco trainers make less greenhouse gases (1.7g CO_2 vs 8.5g) compared to standard trainers. **Use of information from the diagram** • eco trainers are made from plant fibres • eco trainers are made from recycled car tyres **Sustainability** • Plants can be regrown • materials made from plant fibres are renewable • standard trainers use plastics from crude oil that is non-renewable • Less energy is used as less fossil fuels are used **Harmful to the environment** • Fewer greenhouse gases produced for eco trainers • Less impact on global warming from eco trainers. • Less energy is used as less fossil fuels are used so less pollution is made **Use the L1, L2, L3 annotations; do not use ticks.** **Ignore** direct harm to humans
			Total	**8**	

8	a		**Advantages:** flavour / preservative;(1) **Disadvantage** may increase blood pressure / increase risk of heart disease / increase risk of strokes;(1)	2	
	b		salt is pure/ mined salt contains impurities;(1)	1	**Ignore** clean
	c	i	Water;(1) is pumped (into ground and back to the surface); (1) dissolves salt (from the rock);(1)	3	May be labelled on diagram **OR** stated in written response **Ignore** incorrect formula **Allow** makes brine
		ii	hydrogen;(1) sodium hydroxide;(1)	2	Answers in either order.
			Total	**8**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553