OCR
RECOGNISING ACHIEVEMENT

SPECIMEN F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

CHEMISTRY A **A171/01**

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

MARK SCHEME

MAXIMUM MARK 60

This document consists of 16 pages

Guidance for Examiners

Additional guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

   / = 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 = alternative wording
   ORA = or reverse argument

   Eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)
   work done = 0 marks
   work done lifting = 1 mark
   change in potential energy = 0 marks
   gravitational potential energy = 1 mark

5. Annotations:
   The following annotations are available on SCORIS.

   ✓ = correct response
   ✗ = incorrect response
   bod = benefit of the doubt
   nbod = benefit of the doubt **not** given
   ECF = error carried forward
   ^ = information omitted
   I = ignore
   R = reject

6. If a candidate alters his/her response, examiners should accept the alteration.

7. 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.

   Eg
   For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	✓
☐	☐	✓
✓	✓	☐
✓	✓	☐
☐	☐	☐
This would be worth 0 marks.	This would be worth one mark.	This would be worth one mark.

8. 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, eg 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.

9. Marking method for tick boxes:

   Always check the additional guidance.

   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. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.
   Credit should be given for each box correctly ticked. 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.

   Eg If a question requires candidates to identify a city in England, then in the boxes

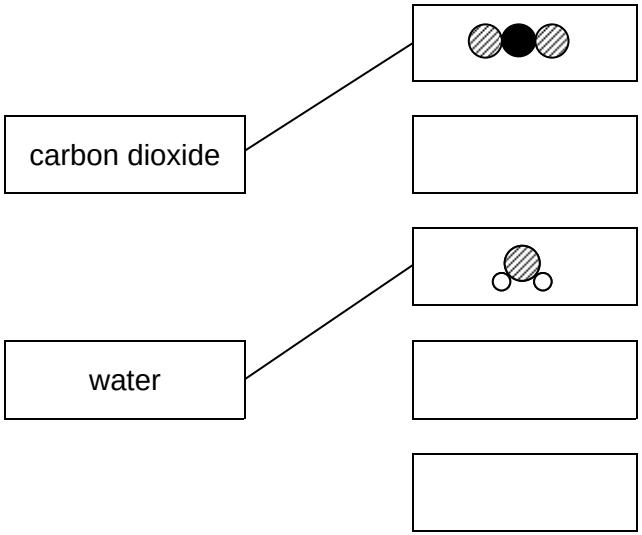
Edinburgh	
Manchester	
Paris	
Southampton	

   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

10. Three questions in this paper are marked using a Level of Response (LoR) mark scheme with embedded assessment of the Quality of Written Communication (QWC). When marking with a Level of Response mark scheme:

- Read the question in the question paper, and then the list of relevant points in the 'Additional guidance' column of the mark scheme, to familiarise yourself with the expected science. The relevant points are not to be taken as marking points, but as a summary of the relevant science from the specification.
- Read the level descriptors in the 'Expected answers' column of the mark scheme, starting with Level 3 and working down, to familiarise yourself with the expected levels of response.
- *For a general correlation between quality of science and QWC*: determine the level based upon which level descriptor best describes the answer; you may award either the higher or lower mark within the level depending on the quality of the science and/or the QWC.
- *For high-level science but very poor QWC*: the candidate will be limited to Level 2 by the bad QWC no matter how good the science is; if the QWC is so bad that it prevents communication of the science the candidate cannot score above Level 1.
- *For very poor or totally irrelevant science but perfect QWC*: credit cannot be awarded for QWC alone, no matter how perfect it is; if the science is very poor the candidate will be limited to Level 1; if there is insufficient or no relevant science the answer will be Level 0.

Question			Expected answers	Marks	Additional guidance
1	(a)			[2]	1 mark for each correct answer
	(b)	(i)	25.2	[1]	
		(ii)	there was a lack of oxygen since carbon monoxide and carbon were produced due to incomplete combustion	[2]	for full marks the explanation must be linked to the conclusion
			Total	[5]	

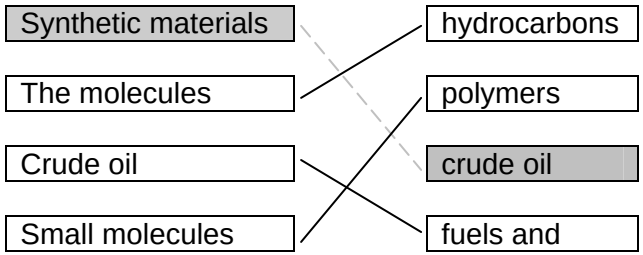
Question			Expected answers	Marks	Additional guidance
2	(a)	(i)	41	[1]	**allow** 40 - 42
		(ii)	2002	[1]	**allow** 2003
	(b)	(i)	as nitrogen dioxide levels decrease, the number of hospital admissions decreases / ORA	[1]	**ignore** correlations with time
		(ii)	☐ ☐ how nitrogen dioxide affects breathing. ✓ similar data from other ... ✓ ☐	[2]	
	(c)		**any two of the following for two marks each** • more efficient engines; which burn less fuel so make less nitrogen dioxide • catalytic converters; that reduce nitrogen monoxide to nitrogen and oxidise carbon monoxide to carbon dioxide • enforced legal limits to emissions; which make people maintain efficient engines	[4]	**ignore** references to sulfur **ignore** refs to public transport
			Total	[9]	

Question			Expected answers	Marks	Additional guidance
3		✎	**[Level 3]** Similarities and differences between the present atmospheres (for the factors mentioned in the question) fully described and related to similarities and differences in the formation of the atmospheres. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5-6 marks) **[Level 2]** Similarities and differences in atmosphere composition and formation partially described with an attempt to relate these to one another. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3-4 marks) **[Level 1]** Limited description of similarities and differences with little or no attempt to relate differences in formation to differences in composition. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1-2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** composition • both contain carbon dioxide and nitrogen • much less CO_2 in Earth's atmosphere and much more N_2 formation • both originally formed from gases released from inside planet/volcanic activity • original atmosphere of both was mainly carbon dioxide • as the Earth cooled water vapour condensed to form the oceans, but Venus may have been too hot for water to condense (this is a 'suggest' question so reasonable suggestion should be credited) • on Earth carbon dioxide dissolved in oceans, but no oceans on Venus (reasonable suggestion) • plants evolved on Earth but not on Venus • (on Earth) as the trees and plants grew they photosynthesised to make their own food • (on Earth) absorbed carbon dioxide • (on Earth) produced oxygen • (on Earth) carbon dioxide decreased in the atmosphere • (on Earth) oxygen increased in the atmosphere • (on Earth) water vapour decreased in the atmosphere • but on Venus carbon dioxide not reduced and oxygen not increased since no plants/photosynthesis
			Total	**[6]**	

Question			Expected answers	Marks	Additional guidance
4	(a)		<table><tr><th></th><th>true</th><th>false</th></tr><tr><td>The world record doubled ...</td><td></td><td>✓</td></tr><tr><td>... between 1948 and 2008.</td><td>✓</td><td></td></tr><tr><td>... between 1960 and 1964.</td><td>✓</td><td></td></tr><tr><td>The record improved ...</td><td>✓</td><td></td></tr></table>	[2]	all 4 correct = 2 marks 3 correct = 1 mark
	(b)	(i)	**any two from:** find the best estimate of the true value identify outliers discard outliers ensure results are reliable	[2]	
		(ii)	**any two from:** human error in measuring weight not placed in middle / weight hung from a different place supports move apart or together / pole in a different position on supports pole does not straighten after weight hung on it	[2]	
		(iii)	11.2	[1]	
		(iv)	10.9 to 11.5	[1]	**accept** 11.5 to 10.9
			Total	[8]	

Question			Expected answers	Mark	Additional guidance
5	(a)		Not all the effects … ☐ Not all the effects … ✓ ☐ ☐ ☐	[1]	tick in any other box = 0 marks

Question			Expected answers	Mark	Additional guidance
5	(b)	✎	**[Level 3]** Answer gives two different examples, each with clear details of the property that changes and a suggested benefit. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks) **[Level 2]** Answer fully describes **one** example **OR** gives **two** examples but omits detail from both. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks) **[Level 1]** Answer names **two** examples but gives no further detail about properties or benefits **OR** gives only **one** example and omits either the property that has changed or the benefit. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** • fibres / cloths / bandages etc. • (have <u>silver</u> nanoscale particles added) • gives the fibre antibacterial properties (that weren't there before) • keeps the material sterile / used in hospitals / keeps wounds clean / stops the spread of bacteria/germs • sports equipment • makes them stronger (than they were before) • lasts longer / does not break / improves performance • relate changes of properties to much larger surface area compared to their volume **accept** any correct example **reject** any answer related to face/skin creams or sunscreens
			Total	**[7]**	

Question			Expected answers	Marks	Additional guidance
6	(a)			[2]	3 lines correct = 2 marks 2 or 1 line correct = 1 mark
	(b)		larger hydrocarbons have larger forces between the molecules therefore more energy is needed to break them out of liquid form into a gas so the boiling point occurs at a higher temperature	[3]	**accept** converse answers for full marks answer must be coherent and logically link points to address the question
			Total	[5]	

Question			Expected answers	Marks	Additional guidance
7	(a)		… increases gradually until age 11. ☐ ✓ ☐ ☐	[1]	
	(b)	(i)	idea that a 1-year-old is much smaller than a 3-year-old (so needs less salt)	[1]	**accept** quoted figures of mass and age from table to make this comparison
		(ii)	Providing that the figure is … ✓ ☐ ☐ It is better to keep the … ✓ ☐	[1]	both required for the mark
	(c)		John's salt intake should be reduced / choose foods lower in salt / owtte	[1]	mark is for advice, not for calculation

Question			Expected answers	Mark	Additional guidance
7	(d)	✎	**[Level 3]** Answer clearly considers (perceived) risks versus (perceived) benefits in the argument *against* lowering salt, and in the argument *for* lowering salt. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5-6 marks) **[Level 2]** Answer for the most part considers (perceived) risks and (perceived) benefits on both sides of the argument. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There may be occasional errors in grammar, punctuation and spelling. (3-4 marks) **[Level 1]** Answer shows a limited consideration of (perceived) risks and (perceived) benefits, but may not address both sides of the argument. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling may be intrusive. (1-2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** Food companies may not want to lower the amount of salt in their food because: • (the companies think) the , cost of reformulating recipes / cost of removing salt / risk of decreased sales (due to , poorer taste / shorter shelf life) , outweighs benefits to health • (the companies think) the benefits of taste and preservative outweigh (perceived) risk(s) to health Food companies should be made to lower the amount of salt in their foods because: • too much salt in a diet increases the risk of high blood pressure, heart disease and strokes • risk / cost , of ill health outweighs benefits of adding salt • benefit to population outweighs , risk / cost , to food companies
			Total	**[10]**	

Question			Expected answers	Marks	Additional guidance
8	(a)		David Carly	[2]	answers in either order
	(b)		Anwar	[1]	
	(c)		Barry	[1]	
			Total	[4]	

Question			Expected answers	Marks	Additional guidance
9	(a)		water is pumped to the salt layer (down the outer pipe) salt dissolves in the water pressure pushes salt solution back to surface (through middle pipe)	[3]	points must be coherently and logically linked for three marks
	(b)		**any three from:** land above mine is unsupported/less stable so land could sink into the mine / subsidence which causes damage to buildings and roads meaning people can't live in houses / have to pay cost of repair	[3]	for full marks answer must be coherent and logically link points **accept** danger from falling into cracks / owtte
			Total	[6]	