OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

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

Mark Scheme for June 2012

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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.

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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

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)		<table><tr><td>oxygen</td><td>21% (1)</td></tr><tr><td>nitrogen (1)</td><td>78%</td></tr><tr><td>argon</td><td>1% (1)</td></tr></table>	2	all three correct for 2 marks two correct for 1 mark
	(b)		**(Level 3)** Answer gives a full explanation of balance between carbon dioxide absorption and release and hence why Sue is correct. Quality of written communication does not impede communication of the science at this level. (5–6 marks) **(Level 2)** Answer gives some ideas of combustion and photosynthesis. Candidate attempts an explanation of the balance between absorption and release of carbon dioxide. Conclusion about Sue's statement may or may not be correct Quality of written communication partly impedes communication of the science at this level. (3–4 marks) **(Level 1)** Answer gives some ideas of combustion or photosynthesis. 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:** • wood contains carbon compounds • when wood burns carbon makes carbon dioxide • when trees grow they take in carbon dioxide for photosynthesis • photosynthesis makes sugar/glucose/carbon compounds • trees use sugar/glucose to make other carbon compounds • trees also respire and produce carbon dioxide • burning wood returns carbon dioxide to the air that was removed from the air as the tree grew • there is no net change of carbon dioxide in the air (carbon neutral) so Sue is correct. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Marks	Guidance
	(c)		**Effects** carbon monoxide is toxic/poisonous/kills (1) sulfur dioxide forms acid rain (1) **Explanation** (max 1 from) carbon monoxide replaces oxygen in red blood cells (1) acid rain kills crops we eat (1)	3	**do not allow** – '**they'** are toxic/cause acid rain must clarify which gas they are talking about **third mark must link to named effect** **allow** other harmful effects
			Total	**11**	

Question			Answer	Marks	Guidance
2	(a)	(i)	2 (1)	1	
		(ii)	17 (1)	1	
	(b)		*any three from:* pattern (maximum 2 marks) nitrogen dioxide (concentration) is highest when number of cars is highest / more nitrogen dioxide when more cars used (1) nitrogen dioxide is lowest when number of cars is lowest / less nitrogen dioxide when fewer cars used (1) graph has two peaks and there are two times when traffic level is high / peaks on graph coincide with high number of cars (1) explanation nitrogen dioxide produced by cars (1) nitrogen and oxygen from air react (in car engines) (1)	3	**allow** there is a positive correlation between nitrogen dioxide (concentration) and number of cars for both pattern marks (2) (if positive missed out then just one mark) pattern answers must link the graph with the tables explanation must link to pattern
	(c)	(i)	attempts to calculate average as best estimate (1) $\frac{286 + 284 + 285 + 281}{4} = 284$ (1)	2	**allow** 2 marks for correct answer without working
		(ii)	value is higher on day 2 (1) because more cars on day 2 (1)	2	**allow** reverse argument **allow** other sensible suggestions eg less windy
			Total	**9**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>any two from:
results would be affected/different/not the same; (1)

different thickness/lengths affects the strength/stretch; (1)

it would no longer be possible to compare the different ropes or polymers; (1)</td><td>2</td><td>do not allow ‘fair testing’ without clarification</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><th></th><th>true (✓)</th><th>false (✓)</th></tr><tr><td>none of the polymers stretch</td><td></td><td>✓</td></tr><tr><td>the polymer that supports the biggest mass breaks at 3000 kg</td><td></td><td>✓</td></tr><tr><td>all of the polymers can support a mass of 1500 kg</td><td>✓</td><td></td></tr><tr><td>the polymer that supports the biggest mass stretches the least for a mass of 1500 kg</td><td>✓</td><td></td></tr></table></td><td>2</td><td>four correct = 2 marks
two or three correct = 1 mark</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>increases … further / more (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>the polymers/ropes break at different loads / are different strengths (1)
the polymers stretch different amounts (at the same load) (1)</td><td>2</td><td>ignore ‘flexible’
ignore comparisons with individual results/polymers
ignore attempts at correlations between properties, e.g. higher mass is more stretchy ORA</td></tr>
<tr><td></td><td>(d)</td><td></td><td>it stretches but not too much / it is fairly stretchy / average stretchiness / stretchiness is middle of the ropes (1)

it is quite strong / takes a lot of load before breaking (1)

correct comparison with others eg some others break too easily / some others stretch too much / the strongest/E does not stretch enough / it is a compromise for stretch and strength (1)</td><td>3</td><td>first two marks are for interpreting data to get properties of C

do not allow it is stretchy/strong without qualification

third mark is to link this to reason for choice by comparison</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
4	(a)		carbon (1) hydrogen (1)	2	
	(b)		**(Level 3)** Answer uses ideas about how molecules are arranged in liquids and gases, the forces between molecules and the energy required to break these forces to explain the relationship between molecular size and boiling points. Quality of written communication does not impede communication of the science at this level. (5–6 marks) **(Level 2)** Answer recognises the relationship between molecular size and boiling points and makes an attempt to explain it. Quality of written communication partly impedes communication of the science at this level. (3–4 marks) **(Level 1)** Answer recognises the relationship between molecular size and boiling points and gives some more information relevant to the question. 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:** • hydrocarbons in crude oil have different chain lengths/different sized molecules • bitumen has the largest molecules and fuel gas the smallest • as size of molecules increases the boiling temperature increases • particles in liquids are closer together • particles in gases are further apart • forces between particles in liquids are stronger than between particles in gases • the bigger the molecules, the larger the forces between them • forces between molecules have to be broken for them to go from liquid to gas • the larger the forces the more energy is needed to break them • more energy requires a higher temperature, therefore boiling point is higher **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	(c)		small; monomers; polymers; long;	2	four correct = 2 marks two or three correct = 1 mark
			Total	**10**	

Question			Answer	Marks	Guidance
5	(a)	(i)	idea of better taste (1) idea of preservative (1)	2	
		(ii)	*any two from:* raised blood pressure; (1) greater risk of stroke; (1) greater risk of heart disease; (1)	2	**allow** sensible answers relating to increase sodium levels, e.g. kidney failure, dehydration etc.
	(b)		**(Level 3)** Answer includes partial explanation of three areas or full explanation of two areas of awareness of risk, government guidelines or benefit outweighs risk. Concludes risk of too much salt outweighs benefit. Quality of written communication does not impede communication of the science at this level. (5–6 marks) **(Level 2)** Answer includes partial explanation of two areas or full explanation of one area of awareness of risk, government guidelines or benefit outweighs risk. Quality of written communication partly impedes communication of the science at this level. (3–4 marks) **(Level 1)** Answer includes relevant comment based on either awareness of risk, government guidelines or benefit outweighs risk. 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:** Awareness of risk • food cooked in salt water has higher salt content • salt is added to food during processing • eating too much salt can lead to high blood pressure • high blood pressure increases chances of having heart disease/stroke • processed food has more salt than fresh food • processed food has a lot of salt Government guidelines • government departments can assess risk involved • government departments publish their findings • people are unaware/ignore Government guidelines • government could regulate or ban use of salt Benefit outweighs risk • fresh food has little salt • salt is added as a preservative/to make food last longer before going bad • salt is added to improve flavour **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**10**	

Question			Answer	Marks	Guidance
6	(a)	(i)	☐ stale urine ☑ (1) ☐ burnt wood ☑ (1) ☐	2	
		(ii)	☐ to neutralise acid soils ☑ (1) ☐ ☐ to make soap ☑ (1)	2	
	(b)	(i)	limestone (1)	1	
		(ii)	hydrogen chloride (1) hydrogen chloride is acidic/toxic / is a gas and therefore spreads easily (1)	2	
		(iii)	chorine (1) to treat water/make bleach (1)	2	2nd marking point is dependent on 1st marking point being scored
		(iv)	neutralisation (1)	1	
			Total	**10**	

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