

Chemistry A

General Certificate of Secondary Education

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

Mark Scheme for June 2013

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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.

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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 |
| <u>words</u> | 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:

| | |
|--|---|
|  | 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 |
| A | 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

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- 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 and 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.*

- 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 | <input type="checkbox"/> |
| Manchester | <input type="checkbox"/> |
| Paris | <input type="checkbox"/> |
| Southampton | <input type="checkbox"/> |

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

| | | | | | | | | | | |
|---------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Edinburgh | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Manchester | ✓ | x | ✓ | ✓ | ✓ | | | | ✓ | |
| Paris | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Southampton | ✓ | x | | ✓ | | ✓ | ✓ | | ✓ | |
| 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) | (i) | all points plotted to within +/- ½ small square | 2 | two or three points plotted to within +/- ½ small square = 1 mark |
| | | (ii) | smooth curve within 1 small square of all points | 1 | allow curve through the given points only if no points are plotted for 1a(i) allow smooth curve for wrongly plotted points (ECF) do not allow more than one line. |
| | (b) | | increases decreases | 1 | allow alternative wording with same meaning allow reverse answer—decreases ... increases |
| | (c) | | rain (1) amount (of coal) the power station is burning (1) | 2 | allow amount of 'water vapour' |
| | (d) | (i) | oxygen (1) water (1) | 2 | either order allow correct formula allow 'water vapour' |
| | | (ii) | NO ₂ (1) car engine/exhaust/power station/combustion of fuels (1) | 2 | allow N ₂ O ₄ |
| | | | Total | 10 | |

| Question | | Answer | Marks | Guidance |
|--------------|---------|---|-----------|--|
| 2 | (a) | <p>(Level 3) Answer makes clear that both Sam and Amy are correct with full supporting evidence, such as numbers of atoms and properties. Quality of written communication does not impede communication of the science at this level. (5–6 marks)</p> <p>(Level 2) Answer makes clear that both Amy and Sam are correct with full supporting evidence for one area, such as numbers of atoms or properties and a weak explanation for the other area. Quality of written communication partly impedes communication of the science at this level. (3–4 marks)</p> <p>(Level 1) Answer gives good evidence to support either Sam or Amy are correct OR answer gives weak evidence to support Sam and Amy are correct. Quality of written communication impedes communication of the science at this level. (1–2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include:</p> <ul style="list-style-type: none"> • one sulfur atom burns • one sulfur atom in sulfur dioxide molecule • one sulfur atom in reactants and in products • two oxygen atoms in oxygen molecule • two oxygen atoms in one sulfur dioxide molecule • two oxygen atoms in reactants and products • equal number of atoms of each element on each side of the equation • sulfur is yellow solid • oxygen is gas essential to life • sulfur dioxide is poisonous gas. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> <p>do not credit the comment that Sam and Amy are correct, as this is stated in the question</p> |
| | (b) (i) | <p>one additional oxygen molecule on left / 2 in front of the one oxygen molecule on left (1)</p> <p>one carbon dioxide molecule on right (1)</p> | 2 | <p>do not allow if there is a visible gap between the oxygens allow slightly overlapping circles Any shape but no gaps between carbon and oxygens and the two oxygens must not touch allow circle with C for carbon/O for oxygen do not allow oxygen circles same size as hydrogen unless labelled with O</p> |
| | (ii) | <p>tick in box 1 (1) tick in box 4 (1)</p> | 2 | |
| Total | | | 10 | |

| Question | | Answer | Marks | Guidance | |
|----------|-----|---|---|--|---|
| 3 | (a) | <p>(Level 3) Answer gives choice for upper and sole with full reasons why these materials are suitable (or others are not) and this is linked to purpose. Quality of written communication does not impede communication of the science at this level. (5–6 marks)</p> <p>(Level 2) Answer gives choice for upper and sole with full reasons why these materials are suitable (or other are not) but choices are not linked to purpose OR full reasons for choice of only one material and this is linked to purpose. Quality of written communication partly impedes communication of the science at this level. (3–4 marks)</p> <p>(Level 1) Answer gives choice for upper or sole with some reasons why they are suitable (or others are not). Quality of written communication impedes communication of the science at this level. (1–2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to E</p> <p>Indicative scientific points may include:</p> <p>Links to purpose</p> <ul style="list-style-type: none"> • both upper and sole need to be waterproof • both upper and sole need to be flexible • preferable if material is sustainable/renewable <p>suitable</p> <ul style="list-style-type: none"> • leather is waterproof/hard wearing/flexible • vulcanised rubber is waterproof/hard wearing/flexible <p>unsuitable</p> <ul style="list-style-type: none"> • cotton not durable/ not waterproof • nylon low sustainability/not waterproof • wood not flexible/not waterproof <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> | |
| | (b) | (i) | tick in box 2 (1) tick in box 3 (1) | 2 | |
| | | (ii) | it makes rubber more durable/more hard wearing/longer lasting/harder/stronger | 1 | owtte |
| | | (iii) | sure range small | 2 | all three correct = 2 marks two correct = 1 mark |
| | | | Total | 11 | |

| Question | | Answer | Marks | Guidance | |
|----------|-----|---------|---|---|---|
| 4 | (a) | pentane | 1 | allow C ₅ H ₁₂ do not allow -130 or 36 | |
| | (b) | (i) | larger ... higher | 1 | allow alternative words with same meaning allow reverse argument |
| | | (ii) | larger molecules have more/larger forces between them (1) the higher the forces between the molecules the more energy is needed to separate them (1) | 2 | |
| | | | Total | 4 | |

| Question | | Answer | Marks | Guidance | |
|----------|-----|--|--------------|--|--|
| 5 | (a) | 52 | 1 | | |
| | (b) | any 2 from: molecules are aligned across the bag ; molecules slide over each other for stretching across the bag ; molecules have to be pulled away from each other/forces between molecules have to be broken to stretch down the bag | 2 | | |
| | (c) | article mentioned (no mark) correct old material named (1) correct new material named (1) plausible reason given for using new material rather than old with reference to the properties needed for the specific article mentioned (1) | 3 | max 2 marks if no article mentioned ignore 'cost' argument | |
| | | | Total | 6 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|----------------|----------|---|
| 6 | (a) | B (1) D (1) | 2 | |
| | (b) | (i) | 2 | do not allow 'evaporation of salt' |
| | | (ii) | 1 | allow 'continental drift' allow ideas of 'sea floor spreading' allow 'convection currents in the mantle ' |
| | (c) | (i) | 2 | |
| | | (ii) | 2 | allow references to other chemical industries benefiting from alkali availability ignore references to 'asthma' |
| | | Total | 9 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|---|-------|---|
| 7 | (a) | red yellow green | 2 | all three correct = 2 marks one or two correct = 1 mark |
| | (b) | <p>(Level 3) Answer indicates that Mary and Joe are both correct/partially correct but Sally incorrect. Opinions are well supported by evidence for each. Quality of written communication does not impede communication of the science at this level. (5–6 marks)</p> <p>(Level 2) Answer only includes acceptable opinions for two of Mary, Joe and Sally with good evidence OR includes acceptable opinions for all three with weak evidence. Quality of written communication partly impedes communication of the science at this level. (3–4 marks)</p> <p>(Level 1) Answer only includes an acceptable opinion for one of Mary, Joe and Sally with some evidence OR two/three acceptable opinions with no evidence. Quality of written communication impedes communication of the science at this level. (1–2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit (0 marks)</p> | 6 | <p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include: Acceptable opinions</p> <ul style="list-style-type: none"> • Mary correct or partially correct • Joe correct or partially correct • Sally incorrect <p>Mary correct/Joe partially correct because</p> <ul style="list-style-type: none"> • you can choose a balance of red, yellow and green • helps you make healthier choices • give an idea of how much salt you are eating. <p>Joe correct/Mary partially correct because</p> <ul style="list-style-type: none"> • traffic light code only gives rough idea of salt content • you do not know which items you will eat on any day • you may still go over sensible salt intake. <p>Sally incorrect because</p> <ul style="list-style-type: none"> • too much salt is harmful • (salt causes) high blood pressure/heart disease/stroke. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|-----------|----------|
| 7 | (c) | <p>any two from: not aware of health implications / not aware that they should limit the amount of salt intake ; not aware of which foods contain high salt content/how much salt they are taking in/many food items contain 'hidden' salt ; do not care how much salt they eat / do not believe salt is harmful / think risk is small / only a recommendation / do not have time to monitor ; think salt improves flavour of food ; think <u>benefit</u> is worth the <u>risk</u></p> | 2 | |
| | | Total | 10 | |

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