



GCSE

Chemistry A

General Certificate of Secondary Education **A321/02**

Unit 1: Modules C1, C2, C3 (Higher Tier)

Mark Scheme for June 2010

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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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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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 |
| <u>words</u> | = underlined words must be present in answer to score a mark |
| ecf | = error carried forward |
| AW/owtte | = alternative wording |
| ORA | = or reverse argument |

E.g. 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.

E.g.

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

Put ticks (✓) in the two correct boxes.

| |
|-------------------------------------|
| <input type="checkbox"/> |
| <input type="checkbox"/> |
| <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> |
| <input type="checkbox"/> |

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

| |
|-------------------------------------|
| <input type="checkbox"/> |
| <input type="checkbox"/> |
| <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> |
| <input type="checkbox"/> |

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

| |
|-------------------------------------|
| <input checked="" type="checkbox"/> |
| <input type="checkbox"/> |

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, 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.

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, e.g. 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.

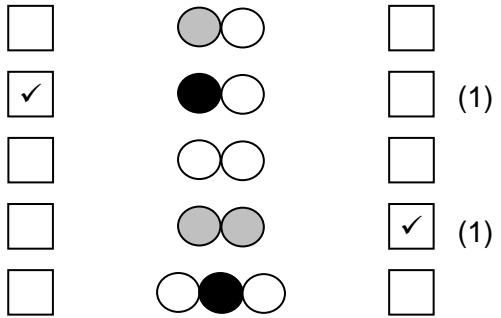
E.g. If a question requires candidates to identify a city in England, then in the boxes

| | |
|-------------|--|
| Edinburgh | |
| Manchester | |
| Paris | |
| Southampton | |

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

| | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|----|
| Edinburgh | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Manchester | ✓ | ✗ | ✓ | ✓ | ✓ | | | | ✓ | |
| Paris | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Southampton | ✓ | ✗ | | ✓ | | ✓ | ✓ | | ✓ | |
| Score: | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | NR |

| Question | | Expected Answers | Marks | Additional Guidance | | | | | |
|----------|---|---|-------|---|---|---|---|-----|--|
| 1 | a | <p>There was a decrease ... <input type="checkbox"/></p> <p>More cars and power stations ... <input checked="" type="checkbox"/> (1)</p> <p>There was an increase ... <input type="checkbox"/></p> <p>More cars were fitted ... <input type="checkbox"/></p> <p>More power stations were fitted ... <input checked="" type="checkbox"/> (1)</p> <p>More people changed ... <input type="checkbox"/></p> | [2] | | | | | | |
| | b | as fuel burns it forms sulfur dioxide (1) sulfur dioxide reacts with oxygen (1) and water (in the air) (1) | [3] | <p>do not allow answers based on formation of carbon dioxide or nitrogen oxides</p> <p>do not allow sulfur is released into air and then reacts with oxygen forming sulfur dioxide for the first mark</p> <p>do not allow sulfur dioxide reacting with/dissolving in rain</p> <p>allow water vapour or moisture for water</p> | | | | | |
| | c | <p>B and D not included in answer (1)</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>A</td><td>F</td><td>G</td><td>C</td><td>E</td> </tr> </table> (2) | A | F | G | C | E | [3] | <p>allow one mark for FBCE</p> <p>allow one mark for three consecutive letters in correct order ie FGC or GCE even if other letter is B or D</p> |
| A | F | G | C | E | | | | | |
| | | Total | [8] | | | | | | |

| Question | | Expected Answers | Marks | Additional Guidance |
|----------|----------|---|-------|---|
| 2 | a | i any two from: it enables an average/mean to be calculated; it allows outliers to be identified (and discarded); it allows for differences in samples / it allows for errors in equipment / it allows for errors in technique / one measurement may be in error; | [2] | do not allow it increases the reliability/accuracy of the results allow it increases the reliability/accuracy of the best estimate |
| | | ii 0.168 (2) | [2] | 2 marks for correct answer allow 1 mark for 0.174 |
| | b |  | [2] | |
| | | Total | [6] | |

| Question | | Expected Answers | Marks | Additional Guidance |
|----------|----|---|-------|--|
| 3 | a | the only factor that is varied must be the one being investigated / only polymer type must be varied / so that the different polymer types can be compared (1) other factors than the one being investigated can affect the results / to make sure no other factors affect the outcome / using different equipment might produce different results / the results would vary with sample size (1) | | [2] ignore references to fair test or fair testing or bias ignore reference to making errors ignore references to getting different results each time unless qualified ignore references to accuracy or reliability |
| | b | ... between the atoms ... <input type="checkbox"/> ... between the molecules ... <input checked="" type="checkbox"/> (1) ... bonded in different ways. <input type="checkbox"/> Some atoms stronger forces ... <input type="checkbox"/> ... higher the forcemore energy ... <input checked="" type="checkbox"/> (1) | | [2] |
| | ii | increasing chain length (1) increasing crystallinity (1) | | [2] each answer must refer to an increase to get the mark allow increase density as an alternative to crystallinity allow add cross-links / increase cross-linking do not allow cross links without idea of adding or increasing allow decrease branching do not allow make polymer branched / increase branching do not allow removal of plasticizer do not allow vulcanisation |
| | | Total | | [6] |

| Question | | Expected Answers | Marks | Additional Guidance |
|----------|----|--|-------|--|
| 4 | a | <p>... renewable ... <input checked="" type="checkbox"/></p> <p>... more attractive appearance ... <input type="checkbox"/></p> <p>... more expensive ... <input type="checkbox"/></p> <p>... will rot ... <input checked="" type="checkbox"/></p> <p>... uses more energy ... <input checked="" type="checkbox"/></p> <p>... used for longer ... <input type="checkbox"/></p> | [2] | <p>three correct answers = 2 marks</p> <p>two correct answers = 1 mark</p> |
| | ii | <p>Plastics have to be imported ... <input checked="" type="checkbox"/> (1)</p> <p>It is easier ... <input type="checkbox"/></p> <p>Leather is more durable ... <input type="checkbox"/></p> <p>Leather can be made locally ... <input checked="" type="checkbox"/> (1)</p> <p>Plastic shoes are not suitable ... <input type="checkbox"/></p> | [2] | |

| Question | | Expected Answers | Marks | Additional Guidance |
|----------|---|--|-------|---------------------|
| 4 | b | <p>... last a lot longer ... <input checked="" type="checkbox"/> (1)</p> <p>Manufacturing energy. <input checked="" type="checkbox"/> (1)</p> <p>... different small molecule ... <input type="checkbox"/></p> <p>... uses chemicals ... <input checked="" type="checkbox"/> (1)</p> <p>... will rot ... <input type="checkbox"/></p> <p>Making takes more energy ... <input type="checkbox"/></p> | [3] | |
| | | Total | [7] | |

| Question | | Expected Answers | | | Marks | Additional Guidance | | | | | | | | | | | | | |
|----------------------|-----------------|------------------|--|--|-------|---------------------|-----------------|-----------------|----------------------|---|--|-----------------|--|---|--------------------|--|---|-----|--|
| 5 | a | i | <table border="1"> <thead> <tr> <th>statement</th> <th>type 1 diabetes</th> <th>type 2 diabetes</th> </tr> </thead> <tbody> <tr> <td>...diet and exercise</td> <td>✓</td> <td></td> </tr> <tr> <td>...young people</td> <td></td> <td>✓</td> </tr> <tr> <td>...its own insulin</td> <td></td> <td>✓</td> </tr> </tbody> </table> | | | statement | type 1 diabetes | type 2 diabetes | ...diet and exercise | ✓ | | ...young people | | ✓ | ...its own insulin | | ✓ | [2] | three ticks in boxes as shown all three correct = 2 marks two correct = 1 mark |
| statement | type 1 diabetes | type 2 diabetes | | | | | | | | | | | | | | | | | |
| ...diet and exercise | ✓ | | | | | | | | | | | | | | | | | | |
| ...young people | | ✓ | | | | | | | | | | | | | | | | | |
| ...its own insulin | | ✓ | | | | | | | | | | | | | | | | | |
| | | ii | <p>Only a few food items ... <input type="checkbox"/></p> <p>... high blood sugar level. <input checked="" type="checkbox"/> (1)</p> <p>Avoiding ... <input type="checkbox"/></p> <p>Both types of diabetes ... <input type="checkbox"/></p> <p>... serious symptoms. <input checked="" type="checkbox"/> (1)</p> <p>... liver stores the excess sugar. <input type="checkbox"/></p> | | | [2] | | | | | | | | | | | | | |
| | b | | <p>Jason <input checked="" type="checkbox"/> (1)</p> <p>Rosie <input type="checkbox"/></p> <p>Steve <input type="checkbox"/></p> <p>Emma <input checked="" type="checkbox"/> (1)</p> | | | [2] | | | | | | | | | | | | | |
| | | | <p>Total</p> | | | [6] | | | | | | | | | | | | | |

| Question | | Expected Answers | Marks | Additional Guidance |
|----------|---|---|-------|---|
| 6 | a | amino acids (1) proteins/polypeptides (1) | [2] | do not allow monomers allow singulars instead of plurals |
| b | | Lightning ... <input checked="" type="checkbox"/> (1) Plants absorb nitrogen gas ... <input type="checkbox"/> Ammonia is made ... <input type="checkbox"/> Nitrogen oxides dissolve ... <input checked="" type="checkbox"/> (1) Ammonia is used ... <input type="checkbox"/> Plants use nitrogen gas ... <input type="checkbox"/> | [2] | |
| | | plant legumes/beans/peas/clover / crop rotation (1) because nodules/bacteria in their roots fix nitrogen / because one crop puts back the nitrogen taken out by others (1) | [2] | do not allow idea of adding compost/dead plants/dead animals/sewage to soil do not allow small scale ideas that apply to gardening but not farming |
| | | synthetic fertiliser is too expensive for farmers in developing countries to buy / manure is free for farmers in developing countries (1) developing countries do not have the technology to make fertiliser / developing countries have to import synthetic fertiliser / manure is readily available in developing countries (1) there is not enough manure in the UK to provide all of the fertiliser that farmers need / synthetic fertilisers are used in UK to produce high yields (1) | [3] | ignore references to organic farming and its supposed advantages |
| | | Total | [9] | |

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

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

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