

Mark Scheme (Results)

March 2010

GCSE

360Science

GCSE Additional Science
Structured Paper C2 (5018H/1H)

GCSE Chemistry
Structured Paper C2 (5038H/1H)

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Using the Mark Scheme

1. This mark scheme gives you;
 - * an idea of the type of response expected
 - * how individual marks are to be awarded
 - * the total mark for each question
 - * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
3. / means that the responses are **alternatives** and either answer should receive full credit.
4. () means that a phrase/word is not essential for the award of the mark but helps the examiner to get the sense of the expected answer.
5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.
6. OWTTE (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.
7. 'Ignore' means that this answer is not worth a mark but does not negate an additional correct response.
8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Marking

1. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
2. **Do not** award marks for repetition of the stem of the question.
3. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

Amplification

1. In calculations, full credit must be given for a bold, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

| Question Number | Answer | Mark |
|-----------------|-----------------------------|------|
| 1(a) | giant molecular, covalent ; | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(b) | covalent ; Allow covalent Ignore single (bond), reject double (bond) | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 1(c)(i) | gives out (heat) energy / heat given out / temperature goes up; Allow correct reference to bond making and breaking | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(c)(ii) | $12 + 2 \times 16 (=44)$; Ignore units | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 1(d) | <p>(Conducts electricity): (electrical) wires, microchips, electronic components, computers, mobiles, TVs</p> <p>(Strong): vehicles (cars, bikes, planes), ropes, (body) armour (bullet proof vest, tanks, helmets, protective clothing), tent poles, sports equipment, turbine blades</p> <p>(Other) Medical but not 'drug' etc (used for drug delivery, medical sensor) Inkjet ink</p> <p>Do not allow clothing (except protective clothing), buildings, bridges, general tubes and pipes eg drainpipes</p> <p>Note: candidates are suggesting sensible <i>possible</i> uses, although large scale use may be outweighed by cost. The above list gives <i>some</i> suggestions</p> | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 1(e)(i) | <p>First mark: (atoms of) same element / same number of protons / same atomic number / same proton number / allow reference to carbon example eg both carbon atoms; [Ignore references to electrons]</p> <p>Second mark: different number of neutrons / different mass number / different atomic mass / allow reference to carbon eg carbon-13 has one more neutron ;</p> | (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(e)(ii) | <p>group 4 /period 2 / second row / sixth element ; Must mention a number, not just the general case Ignore 4th column Reject incorrect group or period</p> | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 2 (a)(i) | same number or amounts (of atoms) of each element on each side ; [Ignore references to equilibrium] | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2(a)(ii) | Any two correct answers from: 1. 300-500 °C (or any temperature or range within these limits); 2. 100-300 (atm) (or any pressure or range within these limits); 3. iron (catalyst); | (2) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2 (b) | have constant composition / can be easily applied / know correct amount to add / insufficient manure available / no unpleasant odour (unlike manure) / developed for specific requirements / quicker acting / faster uptake (by crops) / directly absorbed / readily soluble / easily stored / readily available / more concentrated (in nutrients) ; Ignore hygiene, yield, cost references | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 2 (c) | $\text{NH}_3 + \text{HNO}_3 \rightarrow \text{NH}_4\text{NO}_3$; 1. reactant formulae in either order(ignore wrong balancing) ; 2. product formula (allow any combination of N, H, O making $\text{N}_2\text{H}_4\text{O}_3$) ; [cannot score 2 if incorrectly balanced] | (2) |

| Question Number | Answer | Mark |
|-----------------|--------|------|
| 2 (d) | 100%; | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 3 (a) | One carbon-carbon double bond in a three carbon molecule [NB: not a polymer]; rest of molecule with correct double bond ; (allow -CH ₃ for the methyl group) | (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 3(b) | [Mark all three points independently] Either: 1. (add) bromine (water) ; 2. propane - no change/ no reaction/ orange / yellow / brown / red-brown ; (Reject : red) 3. propene - (goes) colourless/ decolourises ; Or: 1. (add) potassium (per)manganate((VII)) solution ; 2. propane - no change/ no reaction/ purple ; 3. propene - (goes) colourless/ decolourises ; Reject for propene - discolours / clear / white | (3) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 3 (c)(i) | First mark: double bonds open / break / become single bonds ; Second mark: (monomers) form chain / links / bonds / join to each other ; Allow suitable diagram / equation in place of description | (2) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 3 (c)(ii) | e.g. crates - rigid / strong ropes - strong microwave containers - do not easily soften toys - non toxic / can be coloured chemical containers - do not react with acids or alkalis clothing / carpets - tough fibres ; Answer must have a suitable use with a relevant linked property Ignore references to cost | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 4 (a)(i) | loss of or donates (2) electrons / loses outer shell electrons ; | (1) |
| Question Number | Answer | Mark |
| 4(a)(ii) | CaF ₂ ; Reject any other variation | (1) |
| Question Number | Answer | Mark |
| 4 (b) | strong (ionic) bonds/ forces / large amount of energy needed to break bonds or overcome attraction / strong (electrostatic or ionic) attraction between (oppositely charged) ions ; Reject: strong covalent bonds / intermolecular forces / references to molecules or atoms | (1) |
| Question Number | Answer | Mark |
| 4 (c) | calcium ; Allow correct atomic symbol | (1) |
| Question Number | Answer | Mark |
| 4 (d)(i) | one covalent bond / a shared pair of electrons ; rest of F ₂ molecule with 6 unshared electrons on each atom (consequential on first) ; Electrons can be shown as dots or as crosses or both or any suitable symbol (eg e or e ⁻), and can be shown individually or paired If inner shells are shown, these MUST be correct for the second mark Note : 'F' does not have to appear | (2) |
| Question Number | Answer | Mark |
| 4 (d)(ii) | weak intermolecular forces / weak forces or bonds between molecules ; Reject references to bonds unless specifically stated that they are between molecules and intra-molecular forces | (1) |

TOTAL MARK 30

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