

# Mark Scheme (Results)

November 2009

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	Correct Answer	Accept	Reject	Mark
1 (a)(i)	number/amount of protons (in one atom) ;	number of protons and also number of electrons [MUST be clear this is NOT the sum]	no. of protons and electrons / no. of protons in the element	(1)

Question Number	Correct Answer	Mark
1 (a)(ii)	7 outer electrons / need to gain one / same no. outer electrons / similar reactions to other halogens/ it is a halogen/ similar <b>chemical</b> properties (to other group 7 elements) ;	(1)

Question Number	Correct Answer	Reject	Mark
1(b)	relative atomic mass similar/68 and 70 close /  mpt was low/  (oxide) does form colourless solution; (please note that column heading is "properties of gallium" so interpret answers carefully).  [Must refer to at least one specific property eg 'melting point prediction correct = 0; melting point was low = 1]	Gallium forms colourless solution	(1)

Question Number	Correct Answer	Reject	Mark
1(c)(i)	Ga <sub>2</sub> O <sub>3</sub> ;	GA <sub>2</sub> O <sub>3</sub> / ga <sub>2</sub> o <sub>3</sub> /Ga2O3 / Ga <sup>2</sup> O <sup>3</sup>	(1)

Question Number	Correct Answer	Accept	Mark
1(c)(ii)	102 ;	102g	(1)

Question Number	Correct Answer	Reject	Mark
1(c)(iii)	conducts electricity when molten / dissolved / high melting point / high boiling point ; [Any property of ionic compounds acceptable]	reaction of oxide with acid	(1)

Question Number	Correct Answer	Ignore	Reject	Mark
1(d)	full outer shells / 2(He) and 8(Ne) electrons in outer shells / outer shell cannot accommodate any more electrons / do not 'need' to lose or gain electrons;	in group 0 / noble gases / unreactive	both have 8 outer electrons	(1)

Question Number	Correct Answer	Acceptable Answers	Mark
2(a)	cracking;	catalytic cracking / thermal cracking	(1)

Question Number	Correct Answer	Accept	Ignore	Mark
2(b)(i)	alkane: no change (in colour);  alkene: decolourises/turns colourless;	(stays) orange / brown / yellow	clear / discolours	(2)

Question Number	Correct Answer	Mark
2(b)(ii)	$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ &   &   &   & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{H} & & \\ &   &   &   & & & \\ & \text{H} & \text{H} & \text{H} & & & \end{array} ; ;$ <p>Allow one for skeleton with missing H:</p> $\begin{array}{ccccccc} &   &   &   & & & \\ - & \text{C} & -\text{C} & -\text{C} & - & & \\ &   &   &   & & & \end{array} ;$ <p>Allow one for CH<sub>3</sub>CH<sub>2</sub>CH<sub>3</sub> ;</p>	(2)

Question Number	Correct Answer	Mark
2(c)(i)	(one bond in) double bond breaks / forms single bonds;  (many) molecules join together / new bonds form (between monomers) / (molecules) form chain;  [2 <sup>nd</sup> mark <b>consequential</b> on scoring first]	(2)

Question Number	Correct Answer	Reject	Mark
2(c)(ii)	not biodegradable / takes a long time to (or does not) break down, decompose or rot / landfill sites quickly fill up / materials are wasted (as not recycled);	pollution / global warming	(1)

Question Number	Correct Answer	Ignore	Mark
3(a)	forward and back (both) reactions occur at the same rate (speed)/ unchanging amounts of reactants and products / owtte;	both reactions occur at same time / reversible / reactants and products are equal amounts	(1)

Question Number	Correct Answer	Mark
3(b)(i)	100%;	(1)

Question Number	Correct Answer	Reject	Mark
3(b)(ii)	less waste / more economically viable / more profitable / contributes well to sustainable development ;	high yield / more product	(1)

Question Number	Correct Answer	Mark
3(c)(i)	3 shared pairs of electrons between N and H atoms ;  Second mark consequential on first: rest of diagram correct inc. extra 2 N electrons ; (atoms need not be labelled N and H: if inner electrons shown they must be correct for second mark)	(2)

Question Number	Correct Answer	Mark
3(c)(ii)	covalent (bonding);	(1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3(d)	weak forces (between molecules);  between molecules / inter-molecular ;  (Marked independently)	(weak) <b>bonds</b> ONLY allowed if clear that they are <b>between</b> molecules;	weak bonds between atoms / weak forces between atoms or particles  intramolecular	(2)

Question Number	Correct Answer	Reject	Mark
4(a)(i)	chloride (ion) / Cl <sup>-</sup> ;	chlorine (ion) Cl	(1)

Question Number	Correct Answer	Acceptable Answers	Mark
4(a)(ii)	Na <sup>+</sup> + e <sup>-</sup> / e; → Na; LHS = 1; RHS= 1	Na <sup>+</sup> → Na (+ e <sup>-</sup> ); (for one mark)	(2)

Question Number	Correct Answer	Mark
4(a)(iii)	2,8 / 2,8,0;	(1)

Question Number	Correct Answer	Mark
4(b)	<p>1. (1.00- 0.311 ÷) 0.689 (g chlorine);</p> <p>2. Ti : 0.311/48 Cl 0.689/35.5 ;</p> <p>3. Ratio 0.00648 : 0.0194 or 1:3 Empirical formula TiCl<sub>3</sub>;</p> <p>[Last mark is for their ratio → formula and NOT for just writing TiCl<sub>3</sub>]</p> <p>Possible incorrect answers: [If they write inverted ratios in step 2 which gives an answer of Ti<sub>3</sub>Cl this could be worth 2 marks] [If they use 1.00g for mass of chlorine which gives an answer of Ti<sub>3</sub>Cl<sub>13</sub> which could be worth 2 marks] [errors must be carried forward]</p>	(3)

**TOTAL MARK 30**

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