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Examiners' Report/ Principal Examiner Feedback

March 2010

GCSE

360Science

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

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

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5018H Additional Science/ 5038H Chemistry (Structured C2) Examiners' Report

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The paper consisted of four questions, the first question was in common with the Foundation tier and targeted at grades C and D, question 2 also at grades C and D, questions 3 and 4 at the higher grades. In general, candidates who were entered for 5038H 1H performed better than those entered for 5018H 1H. Percentage figures quoted below in the comments about the questions refer to the 5018H 1H entry.

Question 1

Part (a) was a controlled answer question in which the majority of the candidates gave the correct answer. The biggest distracter was the first option. Having been reminded of the types of bonding in the first question, the majority (76.0%) gave the correct answer in part (b).

Most candidates could explain the meaning of the term exothermic in part (c), although some had problems trying to express themselves correctly. The majority of the candidates could work out the formula mass of carbon dioxide. Nearly 65% of the candidates scored both marks on this part, but 7% scored neither mark.

Part (d) gave the opportunity for candidates to suggest a use of carbon nanotubes. Several answers such as 'copper wires' and 'chicken wire' were not credited, but many candidates could make a sensible suggestion based on the fact that carbon nanotubes form fibres that are strong, tough and lightweight. Suitable suggestions here included body protection gear, items that depended on its ability to conduct electricity and drug delivery systems. However, nearly 58% of the candidates managed a suitable suggestion.

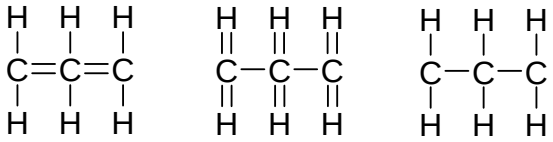
In the last part of the question, many candidates stumbled over an explanation of the term isotope that yielded both marks. Most made the point that the atoms had different numbers of neutrons, but several omitted that the atoms had the same number of protons or that they had the same atomic number. The electronic configuration was understood by many and the majority related it to the group number; however some made the mistake of stating that it was in column 4 which was ambiguous. Equally many correctly stated that carbon was in the second period or the second row which was also credited. The distribution of marks achieved by candidates was evenly spread with over 38% scoring 3 marks, nearly 19% scoring 2 marks and 24% scoring 1 mark.

Question 2

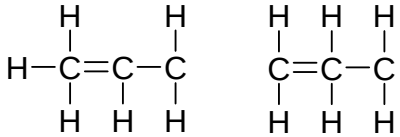
In part (a), although it was clear that many candidates knew that the equation was balanced in part (i), several had difficulty in trying to express themselves clearly. Just over 56% did not score the mark here. We were looking for an understanding that there was the same number of atoms of each element on both sides, but several wrote about an equal number of elements and some erroneously mentioned that there were 2 atoms of nitrogen and 5 *(sic)* atoms of hydrogen on both sides. Unfortunately there were many candidates who latched onto the idea of the equilibrium symbol and tried to state that the equation was balanced because both forward and back reactions were taking place. In part (ii), we were looking for stated conditions for the Haber process – a stated temperature, a stated pressure and iron as the catalyst. Only 15% of the candidates scored both marks, but some gave an answer such as 'a temperature of 150 atm pressure and a high temperature' which

could only score one mark. Both stated temperature and pressure ranges were also accepted within the limits given in the mark scheme. Some 78% of the candidates could not state a condition for the Haber process.
Many candidates failed to score a mark in part (b) because they answered it in terms of an advantage of using fertilisers alone and not making a comparison between artificial and natural fertilisers. Other answers based on yield and cost factors also failed to score. About 40% of the candidates made a useful suggestion that scored.
In part (c), it was really disappointing to see how few candidates could write the balanced equation. The greater majority could only write the correct formula for ammonia and it was only the most able candidate who could give the correct formula for nitric acid and that for ammonium nitrate. Over 97% of the candidates did not score on this item.
The more astute candidates realised that since there was only one product in part (d) that automatically the atom economy had to be 100%. Some candidates just gave the answer of 100% without further explanation, but many tried to give a calculation which yielded a wide range of values from under 2% to over 5000%, although some had carried out a correct calculation to give a final answer of 100%. It was evident that only a few candidates had an understanding of atom economy as only 20% of the candidates scored a mark here.

Question 3
For part (a) the structure of a molecule of propene proved problematical for many candidates. Many gave the correct answer but answers such as



were common and failed to score. Some answers that were considered as worthy of one mark included



Overall just over 50% of the candidates managed to score at least 1 mark, with just over 30% able to give the correct structure.
In part (b), the standard test to distinguish between alkenes and alkanes was expected. Although just under 40% of the candidates scored all three marks, several candidates gave the correct test but the wrong results, or stated that with propene it turned ‘clear’ and some were not credited by using the word ‘discoloured’ at this point. About 40% of the candidates could not identify a suitable test to use. Many candidates wrote about counting bonds or looking at the name.
The ideas behind the polymerisation reaction were poorly expressed by many candidates in part (c); many could explain that the double bonds broke open but fewer could score the second mark involving these then joined together to form long chains. Only 17% scored both marks in part (i), with 58% not scoring a mark. Several

candidates gave a sensible suggestion of an item made from poly(propene), but failed to give a suitable property on which its use was based. Others stated that its use was as a plastic, or even a named (usually incorrect) plastic such as polystyrene. It was clear that many candidates were unfamiliar with the term poly(propene). However, only 23% of the candidates could correctly relate a property with a suitable use for poly(propene).

Question 4

About 44% of the candidates could give a correct explanation of how calcium atoms formed calcium ions in part (a). However, many had the wrong direction for the movement of the electrons by saying it gained two electrons. Other misconceptions here included the calcium atom gaining two positive electrons and that it had gained two protons. Poorer answers gave a description that included sharing electrons. It was disappointing to see how many (70% of the candidates) could not give a correct formula for calcium fluoride having been given the formulae of its ions.

Through the use of an answer such as 'strong bonds' credit was given in part (b), but any mention of molecules / intermolecular forces was rejected. Only 27% of the candidates gave a suitable answer here.

The majority of the candidates (60%) could correctly name the element formed at the negative electrode in part (c), although some came up with alternative metals.

The dot and cross diagram was only answered correctly by the more able candidate. Most (64%) did not appear to know how to start and could only give the electronic configuration of fluorine. Of those who scored on this item, the majority obtained both marks; some (6%) only scored one mark for the correct shared pair of electrons. A few gave an incorrect number of inner shell electrons and as a result could not score the second mark. The final part of the question was scored by only 14% of the candidates. Here the answer had to mention that the forces between the molecules were weak and any unqualified reference to forces was usually worded erroneously to atoms or to the bond between atoms.

Revision suggestions:

1. writing and balancing equations
2. working out the formula of an ionic substance from its ions
3. drawing dot and cross diagrams for a range of molecules
4. drawing the structures of the hydrocarbon molecules mentioned in the specification
5. answering questions from past papers of this specification

Grade Boundaries – March 2010

Multiple Choice Papers – GCSE Additional Science

Raw Mark Grade Boundaries

5015/5027	Max mark	A*	A	B	C	D	E	F	G
H	24	20	18	15	13	10	8		
F	24				16	13	11	9	7

5017/5037	Max mark	A*	A	B	C	D	E	F	G
H	24	17	15	12	10	7	5		
F	24				15	12	10	8	6

5019/5047	Max mark	A*	A	B	C	D	E	F	G
H	24	15	13	11	9	6	4		
F	24				16	13	10	8	6

Uniform Mark Grade Boundaries for these units

	Max UMS	A*	A	B	C	D	E	F	G
H	40	36	32	28	24	20	18		
F	27				24	20	16	12	8

Note: On higher tier papers, the "allowed" grade E is calculated as half a grade width

Structured Papers - GCSE Additional Science

Raw Mark Grade Boundaries

5016/5028	Max mark	A*	A	B	C	D	E	F	G
H	30	17	14	11	9	7	6		
F	30				18	15	12	10	8

5018/5038	Max mark	A*	A	B	C	D	E	F	G
H	30	21	17	13	10	7	5		
F	30				22	18	15	12	9

5020/5048	Max mark	A*	A	B	C	D	E	F	G
H	30	21	19	16	14	11	9		
F	30				20	16	12	9	6

Uniform Mark Grade Boundaries for these units

	Max UMS	A*	A	B	C	D	E	F	G
H	40	36	32	28	24	20	18		
F	27				24	20	16	12	8

Note: On higher tier papers, the "allowed" grade E is calculated as half a grade width

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