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Examiners' Report/ Principal Examiner Feedback

November 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 five questions. Questions 1 and 2 were targeted at C/D level, with the first question common with the foundation paper. The remaining questions were targeted at the higher grades. For this particular paper, 65% of the candidates were entered for the 5038H Chemistry paper.

As a general comment, it was noticed by the examiners that several candidates did not have a calculator with them and so had problems with those questions that required a mathematical response – 1cii, 1d, 3c, 5dii. This was seen by the working they were carrying out on the exam paper. Equally, centres should stress the need for candidates to show calculations as giving a bald incorrect answer scores 0 marks, whereas one with working may score for correct working.

Question 1

In part (a), 83% of the candidates knew that the bond was covalent in (i) and 67% that carbon formed four bonds in (ii). However, fewer candidates (56%) scored the mark in (iii) mainly as a result of describing the C-C bond as a force or as an intermolecular force. The words 'strong bonds' appeared in many answers. There were, however, quite a lot of incorrect answers including intermolecular forces/ bonding; high melting point; high boiling point; it is very hard; giant covalent structure; many bonds.

Part (b) often scored well, with the majority of candidates, who scored both marks, referring to 'layers which can slide over one another'. Both marks were achieved by about half of the candidates. Credit was lost where candidates did not mention layers or sheets of carbon atoms. What made up those layers/sheets was often wide of the mark, layers of molecules, electrons and bonds among others. Many candidates seemed to have an automatic response and gave properties of graphite albeit correct but unrelated to its use as a lubricant, e.g. 'spare' electrons giving rise to electrical conductivity, 'rubbing off' of layers to mark sheets of paper as in a pencil, and the fact that it is a grey solid. While clearly not wrong, these answers did not gain credit. Unfortunately, in a number of cases, they were the only answers given. Some candidates also thought that, because there were weak intermolecular forces in graphite, this meant that it had a low melting point and thus could easily be turned into a liquid which could be used as a lubricant. Other incorrect responses included 'no crosslinks', 'weak structure', or simply, 'weak bonds', but did not make it explicit that they were referring to between the layers.

In part (c), most of the candidates were able to correctly name another recently discovered form of carbon in (i), but it was surprising to see how many thought that diamond or graphite were suitable answers. In (ii), some candidates used 12 x 60 but calculated it incorrectly. A common error was to divide 60 by 12. However, 73% scored the mark for the correct answer.

It is difficult to know how many candidates actually carried out the calculation for part (d), but the majority scored the mark. It was surprising that given the choice of three oxides, several candidates erroneously chose a completely different formula.

Question 2

The greater majority could apply their knowledge to this unfamiliar situation and for part (a) (i), 81% of the candidates gave the correct answer. However, in part (ii), fewer worked out the correct answer for the number of neutrons. In part (iii), a 'different number of neutrons' was a more popular answer than 'different mass number'. A similar number to (ii) scored with a correct answer to this part. Incorrect references to protons and electrons or atomic number were common incorrect answers.

Part (b) was poorly answered by the majority, with only 22% scoring all three marks. The formula in (i) was commonly written as the simple answer CpF, sometimes as Cp_2F, a few as CpF^2, some containing incorrect charges and some written in words rather than as a formula. In part (ii), there were some very long and complete responses explaining in full about electron transfer. Many however gave a short but correct response of 'Cp loses two electrons, F gains one'. Incorrect responses typically included electron transfer in the wrong direction or characteristics of covalent bonding. Many answers just said transfers/lose/gain electrons to get full outer shell or just 'by ionic bonding'. There were also some odd references to electrolysis.

Question 3

Question 3 proved to be the least successful question on the paper. Only a few were able to score well on the whole question.

In part (a), many scored at least one mark with 'free electrons', or 'sea of electrons' which were given frequently, as was 'electrons free to move'. Unfortunately, many gave answers which did not gain credit including 'spare electrons', 'free atoms/ions', some references to high boiling point so won't melt, low density so electrons can pass through, a lot put electrons can carry the current.

Part (b) was very poorly answered with the majority of candidates confusing an alloy with a composite by stating that the metals shared the properties of each other and since titanium was stronger than aluminium it would make the aluminium stronger too. Many candidates said that 'the particles were packed tighter together', that 'the aluminium fills the gaps between the titanium particles' or talked about stronger bonds. In responses close to the expected answer, candidates talked about differences in sizes of aluminium and titanium, without making specific reference to particles/ atoms.

Finally, for part (c), this was generally poorly answered with many candidates not knowing where to begin. Candidates who did get this correct often showed good scientific/ mathematical skills and had set their work out well. Some candidates rounded their answers part way through the calculation thus obtaining an incorrect final answer.

Question 4

The majority of candidates gave a correct answer in part (a) showing an understanding of reversible /equilibrium reactions, with reversible being the more popular answer. There were some references to 'equals' and a 'balanced' equation which did not gain credit.

In part (b), 'to be used again' was a frequent response to this question. Other correct answers included the production of more ammonia and the avoidance of waste. Incorrect responses often hinted at environmental impact or reversible reactions. There were also quite a few correct references to efficiency and atom economy.

The greater majority of candidates gave a correct answer in (c) (i). Slightly fewer scored in (ii); many were clear that it increases/rises/goes up. There was some mention of equilibrium shifting and some confusion about yields.

Question 5

Just over half the candidates gave the correct answer of propene in part (a). The main error here was the confusion with propane.

In (b), most candidates managed to score one mark on this question for a reference to smaller and more useful products. It was rare however for candidates to score two marks. Of these candidates, in most cases, they could have scored three or four from their very thorough answers. A common incorrect answer was that the product was **easier** to handle/use/work with. For some there was confusion with rate of reaction, with a fair number of candidates stating that cracking is useful 'to give a larger surface area so that they can react quicker'. Some thought that the idea of cracking was simply to produce 'more'.

For part (c), the majority of candidates answered on the second diagram, whilst some copied the orbits onto the first diagram. The most common mistake was two electrons instead of four. Some included extra electrons. Crossings out and alterations sometimes made the answer unclear. About half the candidates were able to complete a diagram correctly.

In part (d) (i), many were able to identify the substance as water or steam, but it was surprising to incorrect answers that included carbon dioxide or sulphur dioxide. Yeast was sometimes quoted as a possible substance. In (ii), there were many correct answers, but some had no idea. A few quoted too many numbers after the decimal point and a few gave 0.9 forgetting to multiply by 100. Several had yields of greater than 100% often from the calculation using (1.64/1.48) x 100.

Grade Boundaries – November 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	22	19	16	14	11	9		
F	24				18	15	13	11	9

5017/5037	Max mark	A*	A	B	C	D	E	F	G
H	24	19	16	13	10	8	7		
F	24				15	12	10	8	6

5019/5047	Max mark	A*	A	B	C	D	E	F	G
H	24	21	18	15	12	10	9		
F	24				16	13	11	9	7

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	19	16	13	10	7	5		
F	30				18	15	12	10	8

5018/5038	Max mark	A*	A	B	C	D	E	F	G
H	30	22	18	14	10	7	5		
F	30				17	13	10	7	4

5020/5048	Max mark	A*	A	B	C	D	E	F	G
H	30	20	17	14	11	8	6		
F	30				18	14	11	8	5

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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