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Examiners' Report/ Principal Examiner Feedback

June 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 Examiners' Report
Structured paper C2
June 2010

This higher tier paper consisted of four questions, question one of which was an overlap question with the foundation tier.

Question 1

Many excellent answers were seen describing an atom using the correct terms nucleus and shells. Weaker answers referred to the centre of the atom and the outside. A considerable number of candidates stated that electrons are in the outer shell, implying that all of the electrons were there. Nearly two-thirds of the candidates got both marks. However, candidates were much less good at calculating the number of sub-atomic particles, with just over half the candidates scoring both marks.

In part (b), 88% of candidates correctly answered part (i). There were a few answers of "endothermic" and "chemical", but less than one quarter of the candidates correctly wrote the formula of lithium oxide.

In part (c) there were many good answers with candidates successfully describing what decides the group and the period. A lot of answers showed knowledge of the group number relating to the outside shell electrons. However, fewer were able to explain how the period number was determined. A significant number incorrectly said that the period number equalled the number of full shells, appearing to think that the first period did not exist. Other responses including 'total number of electrons' and the 'first number in the electronic configuration'. There were some responses describing the position of 'atoms' within shells and nuclei, which is unfortunate. It was pleasing to see a large number of well-explained correct answers regarding the relative reactivity of lithium and sodium, most commonly expressed as 'more full shells' and 'the sodium outer electron is further away from the nucleus'. Incorrect answers included 'sodium has a bigger / higher electronic configuration', 'more electrons to react with', 'bigger atom', and even 'intermolecular force stronger'. Some stated 'more reactive as you go down the group' without giving the explanation required. The average mark was 1.25 for parts 1(c)(i) and 1(c)(ii) together.

Question 2

62% could write down the molecular formula of propene, but only a very small number (just over 5%) could give the correct formula for poly(propene). Some gave the correct formula for the repeating unit, but not two (giving either one 'n'). A large percentage drew a structure with a double bond, or a straight chain hydrocarbon structure (with 3 carbons in a row in the repeating unit). Many, perhaps, seemed stuck with their image of poly(ethene) and were unable to apply this to poly(propene).

In part (c)(i), rather surprisingly the correct and incorrect answers were roughly evenly split. In part (ii) some good answers were seen with references to cross links. However, some candidates referred to properties of polymers (such as the ability to be remoulded) rather than structures. Others attempted to describe what was shown

in the diagrams such as 'crossing over' and 'like bricks' without using the correct scientific terms. Overall, the average score for 2(c) was 1.01.

Part (d) was a straightforward question, but there were too many answers lacking sufficient detail. Some candidates lost marks by describing the fumes as harmful or dangerous instead of toxic, with only 60% scoring the mark.

Question 3

The calculation proved itself to be difficult for many candidates, with many scoring no marks. Attempts at writing the calculation in stages was of benefit to some who scored the first mark for one line of calculation, but many answers were unstructured, often just being a jumble of unconnected numbers. Any route was permitted, but the most commonly used technique that led to the correct answer was the use of ratio rather than moles (which are not required).

In part (b) there was a huge variation of answers seen. It was surprising to see that most candidates were used to dealing with the effects of temperature and pressure on the equilibrium position, without being aware of the simple fact that, at equilibrium, there cannot be 100% of the product. There were many incorrect references to the catalyst absorbing some of the product and others who seemed to not understand what a sealed vessel is as they saw either products or reactants escaping. There were many other intriguing answers such as 'some ammonia stuck to the sides of the vessel and wasn't recovered'. There were few correct responses seen.

Part (c) saw some good answers scoring both marks (about 20%) and also many very poor answers showing no idea of ammonia being NH_3 which scored no marks. A small number scored one mark for a simple slip such as missing out the non bonding outer shell electrons. The poor drawing of this molecule often made it difficult to award marks, especially for the shared pairs. There was a surprising number of representations of **two** ammonia molecules (as in the equation), including odd representations of nitrogen compounds containing **two** nitrogen atoms.

Candidates still have problems with intermolecular forces, and although some recognised that this was about weak intermolecular forces they were then not able to take this idea forward to gain the second mark, although this was scored by others because of the marks being awarded independently. However, some candidates referred incorrectly to weak (covalent) bonds between atoms. There were the candidates who have not learnt that compounds are different from the elements that make them up and suggested that the low boiling point is due to ammonia being made from two gaseous elements. 73% of candidates did not score.

Question 4

Part (a) was generally very poorly answered. Some answers were vague, simply stating that the current moves through the sea of electrons, implying that the sea of electrons were a medium through which the electricity travelled. There were a lot of misconceptions about the model used to describe current; 'vibrations', 'electrons passing it on to each other', 'friction generating electricity' were common answers.

About 25% of candidates scored this mark.

In part (b) many answers did not include all the reactants and products with or without correct symbols. A high number got the incorrect formula for hydrogen gas, with H or 2H, with only about a quarter of candidates getting both marks.

Part (c) was better answered. The first mark for particles gaining energy or moving faster and the second for more (frequent) collisions were regularly awarded (nearly half of the candidates). The third mark for recognising that more of the particles had the activation energy and thus the collisions would be more effective was not often awarded (less than 10% of candidates). Some stated that the particles vibrated more rather than referring to actual movement. There were quite a number of responses that mentioned that heat 'acted as a catalyst'.

In the half equation, despite been given an outline equation to complete, many candidates are still unable to do this. The most common incorrect answer was to place Cl in the first space and MgCl in the second space. Some interesting electrons also turned up, such as -2e and e^{2-}.This question was generally poorly answered. 17% of candidates got this mark.

Revision tips

- Practise writing and balancing full and half equations
- Practise writing formulae of ionic compounds
- Know the difference between structural and molecular formulae
- Practise writing the structural formulae of polymers
- Learn what an electric current is and link to your Physics
- Know why molecular substances have low boiling points.

Grade Boundaries – June 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	21	19	17	16	13	11		
F	24				17	14	11	9	7

5017/5037	Max mark	A*	A	B	C	D	E	F	G
H	24	19	17	13	10	7	5		
F	24				16	13	11	9	7

5019/5047	Max mark	A*	A	B	C	D	E	F	G
H	24	19	16	14	12	8	6		
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	20	16	12	9	6	4		
F	30				18	15	12	10	8

5018/5038	Max mark	A*	A	B	C	D	E	F	G
H	30	20	15	11	7	5	4		
F	30				18	15	12	10	8

5020/5048	Max mark	A*	A	B	C	D	E	F	G
H	30	20	18	14	11	8	6		
F	30				19	16	14	12	10

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

Biology, Chemistry and Physics Extension Papers

Raw Mark Grade Boundaries

5029

Max mark	A*	A	B	C	D	E	F	G
60	48	43	38	34	29	24	20	16

5039

Max mark	A*	A	B	C	D	E	F	G
60	55	49	42	36	30	25	20	15

5049

Max mark	A*	A	B	C	D	E	F	G
60	50	44	38	32	26	20	15	10

Uniform Mark Grade Boundaries for these units

Max UMS	A*	A	B	C	D	E	F	G
120	108	96	84	72	60	48	36	24

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