Examiners' Report/
Principal Examiner Feedback

Summer 2010

IGCSE

IGCSE Science (Double Award) (4437) Paper 5H

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4437 Double Award Science (Chemistry) Paper 5H Report - Summer 2010

Section A

Questions in this section are targeted at grades D and C.

Question 1

This question was based on the reaction of metals with water. Most candidates gained the mark in (a)(i), although a number thought lithium would melt or catch fire; it should be noted that "a gas is given off" is not an observation, it is a conclusion – the gas made is colourless and can not be seen. In (a)(ii) there were some answers given which contradicted the answer given in (i); the most common correct answer referred to lilac flame seen with potassium. The most common errors in (b) were to think the reactions produced metal oxides, rather than hydroxides, and to give a name rather than a formula in (ii). Most gained full marks in (c), although a number just gave the result of the test ("squeaky pop") rather than stating a test and result. In (d) many candidates failed to identify the ion concerned, often giving the metal ion.

Question 2

This question was about crude oil. Most candidates gained the mark in (a)(i), although the most common error was 'cracking'. In (a)(ii), many candidates would have been well advised to plan their answers before starting to write. A number described the fractions boiling off one by one (laboratory process) or focussed on the importance of melting points. It should be note that the oil is heated and vaporised before it is passed into the fractionating tower. Part (b)(i) was well answered but (ii) caused unexpected problems, a common error being to give a fraction that was already named in the question; some candidates seemed not to realise that gasoline is petrol while others seemed not to understand that petroleum is crude oil. There were some very poor answers in (c); some candidates attempted to write an equation for cracking while others had one of the missing products being the same substance as they gave for the missing reagent. Part (d) was well answered.

Question 3

This question was about the ionic compound magnesium chloride. Part (a) was well answered, although a small minority of candidates gave the formulae of the ions or used the mass numbers to calculate the electron configurations. Part (b) was well answered by some candidates, with many clear answers seen. However, some candidates stated that the electrons were shared and so scored zero. Part (c) was well answered; only a small minority failed to recall the definition of oxidation in terms of electrons. In part (d), very few candidates scored full marks. Most failed to state that the strong attractions were between oppositely charged ions. By far the most common problem was the incorrect use of terminology; many candidates used words such as 'atom' or even 'molecule' with total disregard for their meanings. If the particles concerned were atoms, then we would be talking about covalent bonding, and if there were intermolecular forces than we would be dealing with a simple molecular substance with a low melting point.

Section B

Questions in this section are targeted at grades A*, A and B.

Question 4

This question was about atoms and was, in general, well answered. In (a) the most common error was to omit a reference to atoms. All aspects of (b) were well answered. In (c)(i) most candidates gained the mark for working out the percentage of Cu-65. A number of candidates gave answers that were not between 63 and 65, and so had to be wrong – candidates should be encouraged to think about their answers in relation to the question. There was also some confusion between significant figures and decimal places.

Question 5

This question was about magnesium carbonate and proved to be very demanding for some candidates. In (a) it was not uncommon to find oxygen on the left hand side of the equation (as though it was combustion) despite the question stating that the process was thermal decomposition. Magnesium was a common product, as was carbon and carbon monoxide. In (b) it was evident that many candidates did not know the solubility rules given in the specification; some candidates selected salts that contained neither carbonate nor magnesium. Some candidates did not read (ii) with sufficient care and proceeded to describe how the salt solutions are reacted together. Most gained the mark for filtration (although some felt the need to describe at length how filtration is carried out); a common omission was the washing of the residue, but some candidates did not seem to understand that the required product was the precipitate and proceeded to evaporate the filtrate.

Question 6

This question was about hydrocarbons. Part (a) was well answered, although a small minority of candidates got the test results the wrong way round or gave an incorrect test reagent (such as bromide). In part (b) the expected error of drawing a linear structure was common, despite the structure in the diagram being drawn in such a way as to try to reduce the chance of this error. Most gained the mark for the name of the polymer, but some candidates went for 'eth' rather than 'prop' and a few called it an '…ane' rather than an '…ene'.

Question 7

This question explored metal reactivity and its application. There were some good equations in (a)(i), although errors in the valency of copper or zinc were common, as were errors in the formula of the sulphate ion. It should be noted that although the copper salt used was a copper(II) salt, the metal produced in the reaction would be copper, and so the symbol Cu(II) is incorrect on the right hand side of the equation. There were few errors in (a)(ii), but some candidates were careless and claimed "copper is less reactive than copper". In part (iii) candidates were directed to use the information in the table. While there were many completely correct answers, a large number thought the zinc sulphate produced would be white (ignoring the fact that it would be a solution) and many only gave one colour change rather than one for the solution and one for the solid. The most common error in (b)(i) was to call the technique 'galvanising' – which it is not (galvanising involves fully coating the surface in zinc, not attaching discrete blocks). Part (b)(ii) was better answered than when it has been asked previously and most candidates worked out the problem with using copper in (iii), although some incorrectly compared the reactivity of copper and zinc.

Question 8

This question was based on the formation and properties of hydrogen chloride. The chemical equation in (a) was very well answered – most candidates scored two marks, and a number scored one (a mark being lost through failure to balance the equation). Those who scored zero normally did so because they had an incorrect formula in the equation – this was often the formula of hydrogen chloride, in these cases the formula given tended not to match the bonding diagram given in (c). Despite many good answers in (b), there were some common errors and omissions; it was common to omit the starting colour of the universal indicator, or mistakenly claim it was colourless. It was, rather surprisingly, also fairly common for candidates to claim the hydrogen chloride was alkaline or that it would behave like chlorine and bleach the indicator. The diagram in (c) was often correct, with only a small minority having missing or additional electrons. There was very careless use of terminology in (d), with 'ions' and 'atoms' being common errors along with the idea that a covalent bond is weak.

Question 9

This question was based on the reaction between magnesium and hydrochloric acid. Errors were common in (a), with incorrect formulae (magnesium with a valency of 1) or monatomic hydrogen being common. There were some good answers to (b), but it is useful in questions of this type if candidates plan out there answers first. When considering collisions, candidates should compare the number of collisions in a given unit of time (so 'more collisions per second' rather than 'more collisions'); the chance of any given particle having a collision is unity, so increasing the temperature does not increase the chance of a collision (although it does increase the chance of a collision being successful). In (c)(i) many candidates claimed the reaction rate increased (presumably confusing the rate (given by the gradient of the graph line) with volume of gas collected). Candidates who correctly stated the rate got lower still struggled to explain why in terms of the reduced frequency of collisions. A common error was to talk about the energy of the particles decreasing (or increasing).

Question 10

The calculation in (a) proved very difficult for some candidates. In (i) all that was required was correct use of the ratio of the stoichiometric coefficients in the provided equation; this did not prevent candidates trying all sorts of mathematical manipulations with the provided data. In (ii) candidates were expected to calculate the relative formula mass of copper(II) carbonate and use this, and the answer to (i), to calculate a mass. A mark was available for correct working if a candidate got the final answer wrong, but it could only be awarded where working could be followed. Part (iii) of (a) proved to be the most poorly answered part of the calculation; many candidates tried to use formula masses in their calculations while those who did the right thing and simply multiplied the number of moles by the molar volume of a gas sometimes still managed to lose a mark by stating incorrect units in their answer. Part (b) was well answered; many candidates knew the formula of the complex ion, while the most common omission was the formation of the blue precipitate prior to the blue solution.

General points

- If a word equation is asked for then a chemical equation (using formulae) will not score. The opposite is also true.
- If **one** or **two** etc. reasons points are asked for then it is not a good idea to give more than the requested number since any errors will lead to the loss of a mark.
- If a colour is required, do not give two colours as the answer as both colours must be correct.
- If a temperature (or pressure) is required then do not give a range since both extremes of the range must be correct.
- Candidates should use words in calculation to explain what they are doing.

SCIENCE (DOUBLE AWARD) 4437, GRADE BOUNDARIES

Option 1 : with Paper 7 (Biology) & Paper 8 (Chemistry)

	A*	A	B	C	D	E	F	G
Foundation Tier				54	44	34	24	14
Higher Tier	80	68	56	45	36	31		

Option 2 : with Paper 7 (Biology) & Paper 9 (Physics)

	A*	A	B	C	D	E	F	G
Foundation Tier				53	43	33	24	15
Higher Tier	80	68	56	45	36	31		

Option 3 : with Paper 8 (Chemistry) & Paper 9 (Physics)

	A*	A	B	C	D	E	F	G
Foundation Tier				52	42	32	23	14
Higher Tier	79	67	55	43	34	29		

Option 4: with Coursework (Paper 10)

	A*	A	B	C	D	E	F	G
Foundation Tier				55	44	34	24	14
Higher Tier	82	70	58	47	37	32		

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demand of the question paper.

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