Examiners' Report November 2008

IGCSE

IGCSE Chemistry (4335)

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4335 Chemistry Paper 1F Section A

Too few candidates entered for this paper to be able to compile a meaningful report. Please refer to report Examiner's Report for **Chemistry 4335 2H** for feedback relating to common questions.

4335 Chemistry Paper 1F Section B / Paper 2H Section A

Paper 1F Question 7 / Paper 2H Question 1

In (a)(i) some candidates tried to write a chemical equation despite being asked for a word equation. Where a word equation is required, a chemical equation will not score the mark(s). It was not uncommon for candidates to try and include the catalyst on the left hand side of the equation, despite correctly stating it was a catalyst in (a)(ii). In part (b) a number of students wanted to collect oxygen by displacement of air. The densities of oxygen and air are too similar for this to be a reasonable method of collection. In (c) both the use of a glowing spill and the result were required for a mark. A lighted spill burning more brightly is not an acceptable result. In part (d)(i) while many candidates knew the flame test colour for lithium, there were clearly many random guesses – it is important that candidates learnt the factual content of this course. The description of ionic bonding in (d)(ii) was sometimes excellent but too often candidates did not realise that oxygen needed to gain two electrons, while others had electron loss and gain but did not realise that the electrons lost by lithium are transferred to oxygen. Any suggestion of electron sharing resulted in zero marks being awarded. The formulae of the ions were often correct despite missing out the numbers of electrons in (ii), although some thought that the oxide ion was O2- rather than the correct O2-.

Paper 1F Question 8 / Paper 2H Question 2

In part (a) the most common error was to state that iodine was a purple solid. While the vapour and solution in some organic solvents is purple, the solid is normally considered to be dark grey. Part (b) was all well answered, although there were some who used iodine rather than bromine and it was not uncommon to have monatomic bromine. Good candidates scored well in part (c), but weaker candidates struggled with both the equation and the name (which they should have been able to work out from the fact that hydrogen chloride forms hydrochloric acid). Again, as in 1(a)(i), a chemical equation scored no marks. In 2(d) while many knew the salt needed to be molten, answers such as "take the bulb out" or "connect the battery the right way round" were not uncommon. Part (d)(ii) was poorly answered, the second and third answers commonly had the word "ions" missing and bromide ions were often "bromine". In (e) the better candidates linked electron gain to reduction but some tried to use arguments based on oxygen – which is not involved in this process.

Paper 1F Question 9 / Paper 2H Question 3

This was often a low-scoring question. While the majority could identify the reaction as neutralisation, correct chemical equations were rarely seen; the main problems seemed to be recalling the formula of nitric acid and the formula/valency of the nitrate ion. In part (b)(i) the most common error was to use a pipette – which is unsuitable since a pipette will only measure a fixed volume of reagent. In (b)(ii) many answers gave only one colour; any colour change requires both the start and the end colours. If a candidate gives only one colour, then we can not tell if this is the start or end colour, and so no marks can be awarded. The description of the salt preparation was very poorly answered. Some candidates redid the titration while others mixed together the reagents but did not state they should use the same volumes as previously found in the titration. It was not unusual to omit to say how the solution was then evaporated or how to tell when to stop the heating/evaporating. When isolating the crystals obtained from the cooled solution many candidates washed their crystals with water. Since the product is water soluble, the water used for washing (which is not an essential step in this case since the solutions should contain only potassium nitrate and water) should be ice-cold.

Paper 1F Question 10 / Paper 2H Question 4

This question was frequently very poorly answered.
In part (a) about half of the candidates scored the mark for the equation, but many just left this blank or clearly did not know where to start. The catalyst for the process was well known. The description of how to produce ethanol by fermentation was often poor, some candidates stuck with ethene as a starting material. All that is required here is a realisation that a sugar and yeast are essential, in addition to these candidates could select two from the need for water, stating a suitable temperature or stating that air must be excluded. Correct equations in (c)(i) were very rare indeed, (c)(ii) was better answered (although "it smells" is not sufficient) but the idea of a gas being made or that there would be no acid left were not uncommon.

Paper 2H Section B

Question 5

Part (a) was generally well answered, although some candidates mixed up group and period and so related the number of electrons in the outer shell to the period. In (b) the common error was not to relate isotopes to atoms. The table in (c) often scored full marks, although, rather surprisingly, the most common error was in calculating the missing percentage. The calculation in (c)(iii) was most commonly awarded zero marks since candidates seemed to have no idea how to approach this routine calculation. Some candidates who obtained the correct answer managed to lose a mark by giving three decimal places rather than three significant figures. In (c)(iv) many candidates tried to explain how the two isotopes would react differently rather than realising that since they have the same number of electrons, they would be chemically identical.

Question 6

Part (a) of this question about metals was not well answered. The explanation of electrical conductivity had to be based on electrons (and not ions); merely stating the electrons are "delocalised" is not sufficient for the second mark – benzene contains delocalised electrons but it is not a good conductor of electricity. What is required is an indication that the electrons are able to more throughout the structure. Very few candidates scored both marks when explaining malleability. Part (b) should have been straightforward, but most candidates showed an electrolyte that did not contain copper and electrodes made from a wide variety of materials were chosen. The reason for using cryolite in (c)(i) was, as is often the case, poorly answered. Cryolite does not lower the temperature nor is there any problem with the melting point of aluminium; it is used because the solution of aluminium oxide in cryolite has a much lower melting point than aluminium oxide itself. Uses of aluminium and copper were well known, but candidates often could not link the uses to a specific property, it should be noted that aluminium is not light, since mass is a function of how much you have, it does, however, have a low density. Some candidates gave clear answers as to how titanium could be extracted, but the given information that had a similar reactivity to aluminium was ignored by many candidates.

Question 7

Very few candidates scored full marks for the equation in part (a), one common error was to get the formula of iron(II) chloride wrong – rather than using iron with an oxidation number of +2 candidates often used two iron ions (Fe2Cl). Part (b) was straightforward for many candidates, but others looked for complicated answers, based on reactivity, that missed the point of the observation. Common errors in (c) included failing to make the salt samples into solutions and omitting to state that the final products were precipitates.

Question 8

The responses to this question suggested that, in general, candidates had a much poorer understanding of organic chemistry than of other parts of this specification.
In (a)(i) most candidates identified the presence of oxygen but from there things went downhill. Very few correct answers were seen to part (a)(ii) – C2H6 was the most common answer. Many candidates got mixed up when explaining what an homologous series was, common errors included trends in chemical properties; same physical properties; same structure; same chemical formulae. In (a)(iv) some good dot and cross diagrams were seen, but there were careless errors with pairs of electrons missed out and some candidates decided to use a compound other than compound A. The remainder of (a) (which concerned poly(propene)) caused candidates numerous problems. The most commonly awarded mark here was for the name of the polymer, the repeat unit was rarely correct – most structures given were linear and in (vii) a number of candidates wrote about carbon having "spare bonds". Some good answers were seen in (b) but many candidates either ignored the given molecular formula or included carbon and hydrogen atoms with variable valencies.

Question 9

It is pleasing to note that many good calculations were seen in part (a). However, (b) was poorly answered with CaO being a common error (and so the equation could not be balanced). While good candidates had little difficulty in suggesting the combustion products of ethyne, some seemed to have no idea that complete combustion produces oxides of the elements in the compound. The bond energy calculation in (c) was often well answered, although it was not uncommon to omit some bonds from the calculation (most often the C-C bond in (ii)) and the final answer in (iii) sometimes had the wrong sign.

Question 10

Most candidates recognised that diamond and graphite had giant structures, although some thought they may be ionic. Part (b) was poorly answered; candidates often failed to state the need to break bonds and that these bonds were covalent. In (c) the importance of the layered nature of the structure with weak forces between the layers was not well known. Part (d) revealed that the majority of candidates do not understand that covalent bonds do not need to be broken when simple molecular structures change state. By far the most common reason was to state that in C60 each C had only three bonds, which were easier to break than the four in diamond. In (d)(ii) candidates were required to explain why they thought C60 would or would not be a lubricant and while some excellent answers were seen, this was beyond most candidates.

4335 Chemistry Paper 03

Question 1

Almost all candidates scored full marks in part (a). In part (b), many candidates thought that a glass beaker might break because of the great heat generated, while several could not find the right words to indicate a method of securing the cup – "in a clamp stand" would have been correct, but not "on a stand", for example. A surprising number were unable to correctly read the thermometers in part (c) – some read each small division as 0.1 rather than as 0.2 °C, while others ignored the fact that the liquid was halfway between two divisions and read to the lower one. The simple point of repeating was usually scored in part (d).

Question 2

In part (a) almost all candidates correctly read the volumes on the gas syringes. In answering part (b), many candidates realised that there was something wrong with the volumes but were unable to express the point precisely enough (eg "used the wrong volume of water", rather than "did not use 25 cm3 of water"), while others were unable to state the correct effect on the concentration or rate. In plotting the graph, more chose to use the volumes of water, rather than volumes or concentration of acid, and some failed to include units. The obvious scale was invariably chosen and the points were usually accurately plotted. A disappointing number drew a straight line even when their points lay on an obvious curve, or included the anomalous point in a distorted curve. The use of the graph to read off the time for equal volumes was usually well done. In part (c), the simple relationship shown by the graph was rarely clearly stated. In part (d), most candidates realised that the beaker had something to do with heat or temperature, but often could not find the right words (eg "to cool the flask" rather than "to absorb the heat produced"). In part (e) most realised the importance of keeping the mass constant, but a disappointing number failed to use their knowledge of kinetic theory in the explanation; some lengthy answers contained neither of the words "particles" or "collisions".

Question 3

Part (a) was generally well done, although several answers referred to the greater capacity or accuracy of the burette. Common errors in part (b) included the omission of the final zero from 13.20 and occasionally reading the scale in the wrong direction (eg 14.80 instead of 13.20). The graph in part (c) was usually well done, with points plotted accurately and straight lines drawn; very few lines did not cross, although a common error was to draw the right hand line directly between the two highest points. The readings from the graph in part (d) were usually correct, but the final part was often given as the same volume as the one read off, rather than subtracting it from 20. In part (e), the idea of using the volumes written down in part (d) proved beyond many candidates. Few good answers were seen in part (f). Several candidates thought that the settling process indicated that the reaction was still occurring, but the description expected in (f)(ii) was frequently blank or that for an unworkable method. The simple steps of filter, wash, dry and weigh did not occur to most candidates, or they included too little detail (eg weighing the residue on the filter paper without either subtracting the mass of a filter paper, or without removing the residue from the filter paper).

Question 4

Most candidates scored 2 or more marks in this question and, although it was impossible to be sure about the amount of guesswork involved, generally those who scored highly in other questions scored 3 or 4 marks here.. Very few wrote down more than two letters.

General Comments

Questions in this paper are targeted at full range of grades from G to A*.

CHEMISTRY 4335, GRADE BOUNDARIES

Option 1: with Written Alternative to Coursework (Paper 3)

	A*	A	B	C	D	E	F	G
Foundation Tier				61	49	37	25	13
Higher Tier	74	62	50	38	25	18		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				64	51	38	26	14
Higher Tier	77	65	53	41	27	20		

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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