Examiners' Report Summer 2007

IGCSE

IGCSE Chemistry (4335)

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CHEMISTRY 4335, CHIEF EXAMINER'S REPORT

Paper 1F, Section A
Questions in this section are targeted at grades E, F and G.

Question 1
This question was generally answered well.

Question 2
This question was generally answered well.

Question 3
This question was about the rusting of iron and the prevention of rusting.
In part (c) the more able candidates could give two suitable coatings, although a common error was to sate "galvanising"; while this is a method of preventing rusting, the question asked for the name of a material used – which in this case would be "zinc". Less able candidates often put answers such as "paper". Methods of preventing rusting should be well known to candidates – it may help engage less weaker candidates if activities such a survey of the school/local area were conducted to see the methods of rust prevention used.

Question 4
More able candidates gained the mark available in (a)(ii), however, many less able candidates tried to draw diagrams for things other than hydrogen – water being a popular choice. The test for hydrogen was well known, although just describing the test as "the pop test" will not gain credit – in all cases of testing for gases or ions the requirement is to first of all state the test (in this case the application of a flame was required) and then to state the result of the test; the mark for the result will not be awarded unless the test used has been correctly stated.

Question 5
A common error in part (b) was to make "zinc chlorine" or "water" as products.
Part (d) directly tests a statement in the specification, hence it was surprising that so may poor answers were seen. Despite requiring substances other than acids, a number of candidates named acids while other guessed and things metals may react with – a common error being "alkali" – probably in response to seeing the word "acid".

Question 6
All that was required in part (b) was the name of an acid, many candidates failed to realise this and gave a wide variety of possible sources of H^+ ions, such as water or even sodium hydroxide.
In part (d)(iv) candidates were expected to give the formulae of the products. The mark for the formula of water was more frequently given than the mark for the formula of calcium carbonate. While at Foundation level candidates will not be required to balance equations, it would be worth their while checking that symbol equations they write are balanced, since if they do not balance without the addition of stoichiometric coefficients then they are wrong.

Question 7
Part (b) proved to be the most challenging question on this paper. Many candidates seemed to have no idea how to approach answering this question while all that was required was a statement that the different fractions had different boiling points and so they condense at different heights as they rise up the column.
Many gained the mark in part (e)(ii) for the production of carbon monoxide, however, it must be pointed out that stating that carbon monoxide is "dangerous" is insufficient for the second mark – this requires either an indication that it causes death (so "poisonous" is correct) or the mechanism by which it causes death.

Paper 1F, Section B / Paper 2H, Section A
Questions in this section are targeted at grades C and D.

Paper 1F Question 8 / Paper 2H Question 1
A few candidates drew two correct curves on the graph; common errors included that for A levelling out slightly higher than the given curve (and that for B slightly below) and failure to label the curves. Some candidates just labelled two points on the existing line as "A" and "B". The test for oxygen was often correct, but errors included the use of a lighted spill or not including a test at all. As in 4(b), no mark can be awarded for the result of a test unless the correct test has been applied in the first place.

Paper 1F Question 9 / Paper 2H Question 2
This question was about the reversible decomposition of ammonium chloride. Although most candidates correctly named the movement of particles as diffusion, a range of other terms was seen, including Brownian movement and neutralisation.

Paper 1F Question 10 / Paper 2H Question 3
Only the more able candidates gained the mark in (a)(ii); some of the less able candidates showing very poor knowledge of organic chemistry and involving water in their answers (clearly being confused with either the use of the word in reference to solutions of the more everyday use of the word in reference to how wet something is).
Very few correct structures for 1,2 dibromoethane were seen. Near misses included structures that retained the double bond but had either penta-valent carbon atoms or the loss of hydrogen. Other attempts showed not only a lack of knowledge of the chemistry involved but also a total disregard for valency.
Part (c) yielded few mark for foundation tier candidates, while it was not uncommon to have structures with the correct number of carbon atoms, it was common to have both tri-and penta- valent carbon atoms and to have an incorrect number of hydrogen atoms.
Whilst this question was generally well attempted by the higher tier candidates. Even so, there were places where many candidates lost marks:
(b)(ii) – showing both bromine atoms on the same carbon atom or retaining the double bond in the final structure
(c) – many structures with the correct numbers of carbon and hydrogen atoms showed carbon atoms with three and five bonds.

Paper 1F Question 11 / Paper 2H Question 4

This question was about the extraction of iron in the blast furnace. The equations in (b) and (c)(i) were generally correct, but in (b)(ii) the acid-base nature of the reaction between calcium oxide and silicon dioxide was not often recognised. In (d) the reduction was usually correctly described as the loss of oxygen, but those candidates who chose to answer in terms of electron gain were much less successful – often electrons were said to be lost by the iron rather than by the iron(III) ions. Most candidates chose a correct use of aluminium in (e)(ii), although the corresponding property often did not score – for aircraft, the commonest error was to use "light" in place of "low density"

Paper 1F Question 12 / Paper 2H Question 5

This question was about the reactions of sodium with water and oxygen. In (a), the observations made during the sodium/water reaction were often correct, although flames and the dissolving of sodium were common errors. The equation often showed sodium oxide as a product, or omitted the hydrogen formed, while a substantial number of candidates gave a chemical equation instead of the word equation asked for. Only the most able candidates scored full marks in (c)(i). Only a minority mentioned the sharing of electrons, although rather more had the electron transfer in the wrong direction. The commonest error was to omit the statement about oxygen gaining two electrons.

Paper 2H, Section B

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

Question 6

This question was about hydrocarbons obtained from crude oil. In (b), a significant number of candidates wrote about fractional distillation instead of cracking. Most answers scored two or more marks – the commonest error was to give the name of a catalyst used for other purposes (such as iron or nickel). The equation in (c)(i) was rarely correct – common errors were to start with a hydrocarbon other than methane and to show hydrogen as a product instead of water. The explanation of the dangerous nature of carbon monoxide in (c)(ii) was often correct, although some candidates failed to mention the toxic nature of the gas or used inappropriate terms to describe its effect on blood (such as "destroys the haemoglobin").

Question 7

This question was about the halogens and hydrogen halides. Part (d) was well answered by few candidates. Although the majority had the colours of litmus correct, a substantial number chose red for both or had the colours the wrong way round. The reason for the red colour in (d)(i) was often given only in terms such as "hydrogen bromide is acidic", with no reference to its reaction with, or dissociation in, water. In (d)(ii) the reason for the blue colour was often given in terms of methylbenzene being an alkali and neutralising the hydrogen bromide.

Question 8

This question was mainly about ethanol and poly(ethene). Parts (a) and (b) were generally well done, but the equation in (c) was rarely correct. The formula of ethanol in (d) was not known by a substantial number of candidates. The structure of poly(ethene) in (e) rarely scored full marks – the commonest errors were to omit the continuation bonds (or show terminal hydrogen atoms) and to retain double bonds in the structure.. The distinction between condensation and addition polymerisation was well answered.

Question 9

This question was about the isotopes and chemistry of iron. The calculation of the relative atomic mass in (b) was usually correct, with most candidates using the correct data from the table and quoting the answer to the required one decimal place. In (c), several candidates lost the mark through referring to protons as well as electrons. In (d), many properties that were generally true for all metals were given, instead of those specific to transition metals. Part (e) was generally well answered, the commonest errors being to omit the oxidation number in iron(II) hydroxide and to leave the equation unbalanced.

Question 10

This question was about the manufacture of ammonia. Parts (a) and (b) were well done, although with a substantial number of candidates losing one mark in the calculation. In (c), there were several references to rate instead of yield. Part (d) proved difficult for many candidates, with references to collision rates and, surprisingly, statements that gas molecules moved faster as the gas liquefies. The bonding diagram in (e) was well attempted, with most candidates showing six shared electrons.

Question 11

This question consisted mainly of calculations concerning a solution of hydrogen bromide. The calculations in (a) were often completely correct, with only less able candidates using wrong methods. The calculations in (b) were also often correct, but the explanation of the neutralisation reaction in terms of proton transfer was known by few. It was disappointing to see many candidates choosing universal indicator to check the point of neutralisation in what effectively was a titration, and even those who chose methyl orange or phenolphthalein gave a colour change for the wrong indicator or the correct colours but the wrong way round.

Paper 3

Question 1
This question was generally answered well.

Question 2
While most candidates managed to pick up some marks in (a) for identifying variables that must be kept constant in order to make the investigation a "fair test", only the best candidates gained all three marks. Common errors included: trying to keep the temperature of the copper sulphate solution constant (despite this being the dependent variable) rather than the start temperature constant; keeping the amount of copper sulphate constant rather than specifying either "volume" or "concentration" (indeed, the amount of copper sulphate could be kept constant while both increasing its volume and decreasing its concentration).
The majority of candidates gained the marks in (d) but some thought that the metals that did not react gave unreliable results despite all the results being identical.
Most candidates gained some marks by drawing a bar chart in (e), although some careless work resulted in bars at the wrong heights. A small minority of candidates tried including bars for the metals that did not react.
The most common error in (f)(i) was the failure to use comparative language – this was essential since the question was based on comparing the reactivity of the metals (hence "zinc gave a big temperature change " did not gain the second mark while "zinc gave the biggest temperature change" did).
Only the least able candidates failed to score in (f)(iii). In (f)(iv) the idea was that the candidates should use the information at the very start of the question to realise that they needed to select a salt of a metal less reactive than copper. Since the question had given them the data to be able to conclude that both silver and gold are less reactive than copper, the expected answer was a salt of one of these two metals. However, a salt of platinum was often given (this, of course, would work and so gained full credit) but often salts of potassium or sodium were suggested.

Question 3
Most candidates gained two marks for plotting correctly the graph points, although some careless plotting was seen – it is recommended that candidates check their plotting by reading (x,y) co-ordinates for each datum point off the graph and then comparing it to the table of data. Fewer gained the mark for the drawing of a smooth curve - some omitted the line all together (the phrase "draw a graph" requires both plotting and a line drawn) while others either joined the points with rule or (very frequently) included the point they had indicated as anomalous in their line. If a point has been identified as anomalous, then it should be ignored when drawing the line.
In (a)(iii) while many candidates could identify a cause for an incorrect reading to be obtained, very few gave enough information to show that the identified problem would cause the time to be longer (slower reaction) – ("wrong concentration of acid" would not get the mark, but "acid too dilute" would).
In (b), most candidates could read values from their graph, but marks were lost in (b)(ii) by either giving only one significant figure (the graph can be read to 2 significant figure, and so the rate can be given to a similar degree of accuracy) or using the temperature rather than the time in the division. Some careless use of calculators was evident, work should be checked. (b)(iii) required the use of the values in (ii) to conclude how rate changed when temperature was increased – this should have alerted those who had figures in (ii) that indicated that the rate decreased as temperature rose, that something was amiss, this was not the case – they either ignored their figures in (ii) or then spent a fruitless time in (iv) trying to

explain how increasing the temperature results in a slower reaction. In (b)(iv) most candidates gained some credit for their explanation but many answers gave only partial explanations.
Most could appreciate, at least partially, the merit of insulating the container in (c), however, only the most able candidates could relate the reduction in heat loss to a more constant temperature. A statement of “more accurate” was not sufficient – even if the temperature is dropping significantly it can be known accurately at any given time simply by reading a thermometer.
Part (d) caused unexpected problems. Candidates had to state how they could obtain results at temperatures below room temperature. This requires the acid to be cooled down, and so what was required was a sensible method of cooling the acid (such as stand it in an ice bath or place the acid in a fridge). Common wrong answers included “do not heat the acid as much” – (any heating will raise its temperature and so this would not work); “do the experiment in a colder room” (it is normal to change the temperature of the chemicals and not the environment when studying the effect of temperature – we do not go into successively hotter room when increasing the temperature); “use more concentrated acid” – (why making the acid more concentrated should reduce its temperature remains a mystery).

Question 4
Many candidates gained full marks for completing the table in (b). However, some candidates failed to record all of the data.
Only the most able candidates gained marks in the remaining parts of this question. In (c) the idea of the tap being open was rarely seen, one common wrong answer was to state that not enough iron was used (any amount of iron would still cause some change in water level) while it was not uncommon for candidates to enter into an explanation based on pressure and the trough of water – suggesting that the water level would never change in this experiment.
In (d) a few candidates spotted that we did not know the starting volume for the air but few could suggest a solution to the problem; some suggested entirely different experiments.

COURSEWORK (PAPER 4), PRINCIPAL MODERATOR'S REPORT

General Comments on Science Coursework

The coursework component is only available to centres which are recognised by Edexcel as International Teaching Institutions.

The number of students entered for this component of the iGCSE examination was as follows:

Code	Subject	Number entered in 2007	Number entered in 2006
4335	Chemistry	243	193

All of the centres that entered students for this component of the examination had their science coursework moderated by Edexcel's co-ordinating Principal Moderator for GCSE. The moderating instrument used was the Sc1 criteria as used by Home centres, using exemplars provided by the JCQ (Joint Council for Qualifications) as a guide.

Centres entering students for the coursework component of the iGCSE examinations in 2007 therefore had their coursework moderated to the same standards as for all Home centres.

Chemistry 4335

The most common task seen this year was once again a rates task – sodium thiosulphate / hydrochloric acid.

This is a very common task in UK centres, but it does have some disadvantages.
Firstly, if the students (or teacher) decide to investigate the effect of varying the concentration of sodium thiosulphate solution, it is difficult for the students to incorporate sufficient scientific knowledge to fully access P8a.
It is more appropriate to study temperature as the variable, so that students can discuss exo and endothermic steps, as well as the concept of activation energy.

Centres who awarded full marks for the visual disappearance of a cross in the thiosulphate/acid task were too generous in skill O. The observation of a cross disappearing as the precipitate of sulphur forms is a subjective matter, and therefore lacks **precision**. (Precision is a key factor in the award of O8a). Please note also that the requirements of O6a and O6b should be fully met before O8a is considered. For this task, seven marks is generally considered to be the maximum, if observation of the precipitate is carried out by eye.

Other tasks seen this year included the effect of marble chips on different concentrations of hydrochloric acid, and the combustion of alcohols. These are appropriate Chemistry assessment tasks.

CHEMISTRY 4335, GRADE BOUNDARIES

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

	A*	A	B	C	D	E	F	G
Foundation Tier				59	47	36	25	14
Higher Tier	82	69	56	44	31	24		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				60	48	36	24	12
Higher Tier	86	72	58	45	32	25		

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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