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Examiners' Report/ Principal Examiner Feedback

Summer 2010

GCE O

GCE O Chemistry (7081) Paper 01

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Chemistry 7081 / 01 Report - Summer 2010

General

The paper provided candidates with the opportunity to demonstrate their knowledge and understanding of a range of topics and there were some outstanding performances. Some explanations involving kinetic theory lacked precision and there was some confusion about energies involved in bond breaking and bond formation. The confusion in some cases is because candidates seem to have been taught material outside the scope of the syllabus; while this is to be applauded for the more able students, weaker candidates may struggle to understand the finer points.

Question 1

Most candidates scored highly, the main errors being for the formulae of lead carbonate and the carbonate ion.

Question 2

This question was well answered.

Question 3

Questions asking for colours of chemicals always produce a variety of shades; the colour of liquid bromine is red-brown or brown not 'red'. There were no problems with the other colours.

Question 4

This was a high scoring question, the only difficulty being with the potassium ion. The proton number and mass number were sometimes reversed and the charge was also omitted on occasions.

Question 5

This was slightly harder than the previous questions but a score of five marks was quite common.

Question 6

There were many good answers. The main errors were in the formulae for potassium carbonate, aluminium sulphate, aluminium hydroxide and sodium ethoxide. Some equations that had correct formulae were left unbalanced. In some cases there were unnecessary brackets and charges but these were not penalised unless there was an error.

Question 7

In (a), there was a lack of clear description of the changes involved. In particular, many candidates wrote that the blue solution turns brown because of copper formed. It was necessary to state that red-brown copper is deposited and the blue colour fades because Cu^{2+} ions are removed from solution (and are replaced by colourless Zn^{2+} ions). The division of (a) into two sections was largely ignored and it was possible to find the required points in either section; this was not penalised. The equation was usually correct but state symbols were sometimes omitted. Part (b) caused problems because it was not always clear whether 'a brown solution' was the result of a reaction or simply because bromine had been added. The equation was quite often incorrect because of an incorrect formula for the sodium salt or because 'Br' or 'I' was written.

Question 8

Both parts of (a) are standard processes that have been examined many times before but the same errors occur. The fermentation is not carried out in an 'air-tight' container because it would explode. It requires an air-lock or similar to let the carbon dioxide escape. The question wanted concentrated aqueous alcohol as the product so fractional distillation is necessary. There were numerous long methods starting from starchy materials that ran out of words before the required stage was reached. In the hydration of ethene, accepted pressures and temperatures were in the ranges 40-100 atmospheres and 250-500 ^{o}C. In (b)(i), the answer was 'sugar is a renewable resource' and there were a number of possibilities for (ii).

Question 9

In (a)(i), it was necessary to make clear that boiling removes dissolved air. Part (a)(ii) was often correct apart from the balance of the ionic equation where even very good candidates missed the '3' before the 'OH^{-}'. Part (b) was well answered but candidates should note that magnesium does not rust – only iron does that.

Question 10

In (a), the balancing of the equations was often correct. In (b)(i), the mole ratio of 1:2 for zinc and electrons from the equation was rarely recognised and so '20 moles' was a common answer. There were also many ridiculous answers involving multiples of 96500. A transferred error was allowed in (b)(ii), (iii) and (iv) so marks were obtained if the moles were incorrect but the chemical calculation was valid.

Question 11

This question required explanations involving particles and the kinetic theory and correct terminology was important. There was some confusion between faster collisions and more frequent collisions and also when using arguments involving activation energy.

In (a)(i), the answer was that a greater surface area would lead to more frequent collisions. In (ii), candidates who chose to raise the temperature were usually successful in gaining three marks whereas those who chose to increase the concentration often scored two. This was because they wrote that there were 'more particles present' but omitted 'in a given volume'; simply adding more acid would give more particles but would not necessarily lead to a greater chance of a collision.

In (b)(i) and (ii), many candidates realised what was required and scored the marks but some were totally confused by the idea of equilibrium. Part (iii) often scored two marks because the fact that the molecules would be closer together (hence more frequent collisions) was rarely mentioned. Note that the collisions would not be 'faster'.

Question 12

There were many pleasing answers to part (a). The commonest error was to break three C-C bonds instead of two in (i). In (a)(iii), the calculation had to be written '$\Sigma\Delta H$ bonds broken minus $\Sigma\Delta H$ bonds formed' or equivalent to score the marks. Part (b) was an exercise in data interpretation. It was insufficient to simply quote the figures from the table; they had to be used in the explanations. What was required was to state that the bond strength of Si-Si is weaker than that of C-C and so silicon chains are less stable and less likely to form. Similarly, the Si-O bond is stronger than the Si-H bond and so a compound with Si-O bonds is more stable and more likely to form.

CHEMISTRY 7081, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	75	63	51	46	29

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

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