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Examiners' Report/ Principal Examiner Feedback

January 2010

GCE O

GCE O Level Chemistry (7081) Paper 01

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CHEMISTRY 7081/01 REPORT JANUARY 2010

General Comments

The paper provided candidates with the opportunity to demonstrate their knowledge and understanding of a range of topics. Calculations were well done but some descriptions of observations were imprecise. Equations were often incorrectly balanced, particularly the ionic ones. Candidates need to be more careful when using terms such as 'atom', 'molecule' and 'ion'; they are not freely interchangeable.

Question 1

In part (a), the charges on the ions were often incorrect. In part (b), the oxidation state of iron was sometimes missing.

Question 2

This question produced some high marks.

Question 3

Common incorrect answers were 'group' in part (a) and 'magnesium' in part (d).

Question 4

This question caused some problems. 'Nitrogen dioxide' was a popular choice in part (b) and there were few correct answers to part (c). In part (e), 'anhydrous' was often omitted even though the correct cobalt salt was stated. In part (g), 'oxygen' was a surprisingly common wrong answer.

Question 5

There was confusion here between moles of molecules and moles of atoms.

Question 6

There were some very good answers to this question but there were also some common errors. There was a failure to realise that there are covalent bonds within the layers but only weak intermolecular forces (not 'bonds') between the layers, resulting in the layers being able to slide over each other ('move' was insufficient). There are delocalised electrons in the structure which can move (not just 'free electrons'). The reason that diamond cannot conduct electricity is because all the outer shell electrons of carbon are used in bonding (to other carbon atoms, not 'to each other').

Question 7

In order to score further marks, the test had to be correct.
In part (a), most opted for the addition of silver nitrate with the production of a white and a yellow precipitate. Some used chlorine water which was acceptable and a few chose bromine water which was also allowed but a one mark penalty was applied if 'liquid bromine' or 'bromine gas' was used.
In part (b), the easiest method is to add an acid and look for effervescence from the carbonate; an observation is required so 'evolution of gas' is not good enough unless accompanied by 'which turns lime water milky' or similar. Other correct tests were accepted. Many candidates suggested heating and observing that the carbonate does not decompose whereas the nitrate produces a gas that relights a glowing spill. Unfortunately, the starting point is a solution of each compound and so, unless they first evaporated to dryness, they were penalised one mark for this procedure.
In part (c), adding water was the simplest test but a flame test or the addition of **aqueous** sodium hydroxide or ammonia was equally acceptable.

Question 8

The calculations were well done by many candidates. A common error was to state that 2 moles of carbon dioxide were being used leading to 120 g; some totally ignored the units given and used 2 moles to produce 120 kg of product. In (b), errors were to use '14' and '120'; some rounded '46.66' to '46.6'.
In part (c), many candidates failed to realise that ammonium nitrate is highly soluble and would be washed away by heavy rain whereas urea would be retained in the soil for a longer period of time.

Question 9

Some marks were easy to obtain but there were common errors in other parts. In the first equation, there was a tendency to include MnO_2 as a reactant and few correctly balanced equations were seen. Despite being given part of the equation in part (b)(i), there were many balancing errors. In the test for chlorine, it is not necessary to state that the litmus paper turns red before being bleached but it certainly does not turn blue! In part (b)(iv), 'catalyst' was not accepted as $MnCl_2$ does not perform that function.

Question 10

Part (a) confused many candidates who could not distinguish between the effect of the changes on rate of reaction and the effect on the position of equilibrium. There was no need to give an explanation here – just 'increases rate', for example, was adequate. Answers such as 'right', left' and 'fast' were judged to be incomplete. Part (b) was sometimes confused with the Haber process. In part (c), candidates were expected to recognise that the reaction is exothermic.

Question 11

In part (a), the green powder was sometimes thought to be an iron(II) salt. In part (b), an incorrect Group 1 metal was given some credit if the corresponding hydroxide was identified as F. Part (c) was not well done and few identified G as iron(III) sulphate.

Question 12

In part (a)(i), the structures were often correct and most knew that an unsaturated compound contains a double bond; the question asked candidates to identify the bonds present in a saturated molecule so a reference to all the bonds being single bonds was required. Some invalidated their definition of isomerism by referring to 'elements' with the same molecular formula but different structures. There were many good answers to part (b).

Question 13

This question caused problems for many candidates. Few could write a correct ionic equation; even when the formulae of the ions were correct, the balance was often wrong. The question gave information about the states of the reactants and products but it was usually ignored when assigning state symbols. The final ionic equation must not contain spectator ions. The calculations in parts (b) and (c) were fairly well done.
In part (d), the explanation was rarely correct; many attempts involved collisions of particles and rates. It was necessary to recognise that at the start there is an excess of potassium iodide and the mass of the precipitate increases until a mole ratio of 1:2 is achieved according to the equation. At that point, the potassium iodide is completely reacted so further addition of the metal nitrate has no effect. The calculation in part (e) was well done and many scored all five marks.

CHEMISTRY 7081, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	**67**	**52**	**38**	**33**	**23**

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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