Rewarding Learning

GCE AS Chemistry (New Specification)
Spring 2009

Chief Examiner's Report

GCE AS CHEMISTRY (NEW SPECIFICATION) (SPRING SERIES) 2009

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Module 1

The paper was successful in giving all candidates an opportunity to engage with most of the questions. It also discriminated between the more able candidates and the less able candidates. The mark scheme was easy to follow. The candidates appeared to have ample time to complete the paper.

Q.11 This question was generally well answered.

Q.12 (a) The flame colour for barium and calcium ions were generally well known. The copper ion was often described as green without indicating the blue-green nature of the flame.

(b) The diagram was generally well answered. The main sources of error were the failure to show the electron moving in both directions and showing the electron falling back from a level greater than that to which it had been excited. The explanation was generally very good. A few candidates failed to state that the energy was given out as visible light.

(c) This was poorly answered with few candidates gaining both marks. Those who got a mark for the equation $E = h\upsilon$ failed to state the frequency to be used. A number of candidates discussed the convergence limit but were unclear as to the significance of the frequency.

Q.13 (a) (i) A surprising number of candidates did not understand what was meant by a standard solution. A number thought it was a 'pure solution' and the concentration and volume were also frequently given. A few candidates suggested that it was a 0.1M solution.

(ii) The equation was generally well answered. Only a few candidates gave H_2CO_3 instead of H_2O and CO_2.

(b) Many candidates gained full marks for the calculation and most scored at least some marks. Mathematical mistakes were common and some candidates had difficulty with the final step.

(c) Many candidates knew that the indicator was methyl orange but were unable to give the correct colour change. Yellow was the only acceptable answer for the alkaline colour with the range orange-red being accepted for the acid solution. Phenolphthalein was incorrect for the indicator although the colour change of pink to colourless was accepted as a carry through error.

Q.14 (a) (i) The equation was generally well worked out. The most common error was showing one molecule of carbon dioxide instead of two. Some candidates failed to show the decomposition of both carbonates.

(ii) This equation was less well answered and required the candidates to use the information in the stem of the question. Carbon was often missing from the equation or present as C_2. Chlorine was sometimes given as 2Cl instead of Cl_2.

(iii) This was generally well answered, but some candidates still discussed the movement of electrons instead of ions. The examiners required the *movement* of ions to carry the electric current and not just the ions carry the electric current.

(iv) The question required the formation of the atoms from the ions and many candidates lost a mark for giving the reverse change. Dot and cross diagrams were sometimes incorrectly used, with many candidates showing either only dots or crosses on the chloride ions.

(b) (i) The diagram was well known but a surprising number of candidates failed to include the labels. The magnesium ions were often incorrectly labelled as magnesium atoms.

(ii) This was generally well answered. A number of candidates mentioned electrons carrying the charge without discussing the movement of the electrons. A few candidates failed to describe the delocalised electrons but rather described the movement of all of the electrons.

(c) (i) This equation was generally well known with the most common error being the failure to include the state symbols.

(ii) This was generally well answered. The main mistakes were starting the graph on the y-axis and failing to join the points. A few candidates drew the graph of 1st Ionisation Energies for elements 1-12.

(iii) Most candidates were able to gain at least one mark for increased shielding in the calcium atom. Only the more able candidates were able to refer to the outer electrons being further from the nucleus in calcium; many simply referred to electrons being further from the nucleus without being specific.

Q.15 (a) The calculation of the number of moles in 1 dm^3 of air proved problematic for some candidates. Many candidates were able to gain the remaining two marks by carrying the error through. A number of candidates were able to calculate the number of moles of air but were unable to continue with the subsequent steps. The most able candidates generally gained full marks.

(b) (i) This was generally well answered with most candidates gaining at least one mark and the majority gaining both marks.

(ii) This was generally very well answered with only a small number of candidates failing to gain both marks. A few candidates rounded up their answer to 132.

(c) (i) Most candidates were able to identify the oxidation numbers correctly. A small number failed to include the + sign and accordingly lost a mark. The most common error was in the calculation of the oxidation number of xenon in $HXeO_4^-$.

(ii) The candidates generally knew the definition of disproportionation, but many failed to apply it to the reaction by using the oxidation numbers.

Q.16 (a) (i) Poorly answered. Some candidates identified both bromine and iodine as gases. The only acceptable colour for bromine was red-brown. Iodine could be described as grey/black. A number of candidates described iodine as being purple or purple-black.

(ii) This was well answered with most candidates gaining at least one mark for describing the increase in Van der Waals forces.

(iii) The definition of electronegativity was well understood. The explanation was not well understood. Candidates often referred to outer electrons instead of bonding electrons when referring to the distance from the nucleus and the shielding of the inner electrons.

(b) (i) This equation was not well known with many of the responses appearing to be guesswork.

(ii) Few candidates knew the correct answer or were able to use the oxidation number correctly to work out the answer.

(c) (i) A reasonable number of candidates referred to the polarity of the molecules concerned and were able to relate this to the solubility of iodine. A number of candidates simply referred to 'like dissolves like' which was insufficient to gain any marks.

(ii) Most candidates were able to give the correct colour.

(d) (i) This equation is generally well known although some candidates lost a mark for giving Na_2SO_4 instead of $HaHSO_4$.

(ii) This was generally well answered although some candidates gave a long list of possible products in the hope of getting some correct.

(iii) Most candidates were able to give the correct trend and a reasonable number of these were also able to give the correct explanation.

(e) (i) Although generally well answered, it is disappointing that not more candidates were able to give this simple ionic equation.

(ii) This was generally well answered with many candidates gaining full marks.

(f) Many candidates referred to fluoride as preventing tooth decay rather than reducing tooth decay, some also referred to cavities without stating that they were in the teeth. The concept of freedom of choice was poorly expressed and was often not related to the question ie they had no freedom of choice as to whether they had a fluoridated water supply or not.