A-LEVEL
CHEMISTRY

CHEM1 Foundation Chemistry
Report on the Examination

2420
June 2014

Version: 1.0

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General Comments

Students were able to access all of the marks on the paper. The overall standard of responses showed that there was a clear understanding of most of the principles involved. Generally, answers were expressed reasonably well and with good use of English. However, there is still a lack of accuracy in some students' answers using the chemical terms atom, ion and molecule. The recent improvement in answers to mathematical questions continues but there are still some students who lack an understanding of the difference between decimal places and significant figures.

Once again, some handwriting was very small or very faint, which introduces the possibility of ambiguity. Students should be reminded to cross out work that has been replaced so that contradictions between answers are not seen. Often, answers not crossed out on the script were contradicted by answers given on additional sheets and this caused marks to be lost.

Question 1

The overall performance in part (a)(i) was disappointing because many students did not know the subatomic particles in the hydrogen atom. The mark in part (a)(ii) was scored by most students. Many students scored both marks in part (b)(i) but several quoted an equation involving *x* and *y* but could not progress beyond that. The majority of students answered part (b)(ii) correctly and part (c) was also generally well done. In part (d), many students used Br instead of B in their equation and some either wrote the wrong ionisation energy or failed to add state symbols. Many answers to part (e) were superficial; many students simply referred to a different proton/electron ratio or the removal of an electron from a different energy level.

Question 2

Most students could calculate the amount in moles in part (a)(i) but some did not give their answer to the required precision. In part (a)(ii), some students did not use the stoichiometry of the equation to answer the question. Many students found part (a)(iii) difficult because they could not calculate the number of moles of NO_2 to substitute into the Ideal Gas equation. The conversion of pressure and temperature into the appropriate units was also often incorrect. Part (b) was not well known and in part (c) many students failed to see the significance of gaseous products.

Question 3

This question was generally quite well answered. In part (a)(i), most students knew the correct block in the Periodic Table although some seemed to think that the name 'Transition Metals' was enough to identify the d block. In part (a)(ii), the biggest issue was the omission of 'positive' when describing ions and 'delocalised' when describing the electrons involved in the bonding. The diagrams in part (a)(iii) generally scored highly but some were untidy and failed to show a regular arrangement of ions. Surprisingly, many students did not refer to layers of atoms/ions sliding in part (a)(iv) and therefore did not score the mark. Answers to part (b)(i) were disappointing and showed that students could not write the electron configuration of ions in the d block. Balancing the equation proved difficult but a good number of students did this well and many students could suggest a suitable substance in part (b)(ii).

Question 4

Hydrogen bonding was well known in part (a)(i) and the diagram to show the interaction in part (a)(ii) was also generally well done; the main error was failing to show the hydrogen bond from the lone pair to the Hδ+. Part (b) was generally well known but some students thought that the electron pair came from the boron atom.

The definition in part (c)(i) was well known by most students but there were still some who referred to single electrons or referred to an element/substance rather than an atom/nucleus or forgot to mention the type of bond. Responses to parts (c)(ii) and (c)(iii) often showed a lack of understanding; many students could not select the correct elements to write a formula and for those who could select the correct elements the ratio in the formula was often incorrect.

Question 5

Part (a) was very well answered but many students could not give a correct balanced equation in part (b); some gave carbon as a gaseous product. Answers to part (c) were mixed. Some were excellent and gave the correct answer and condition but far too many thought that the nitrogen was from a nitrogen-containing impurity in the paraffin. Equations given in part (c)(ii) were generally good but many students found writing the equation in part (c)(iii) more difficult.

The general formula of the alkanes was well known in part (d)(i). Answers to part (d)(ii) suggested that many students did not read the question carefully and so did not write equations giving two molecules with equal numbers of carbon atoms. Due to this error, the empirical formula was often incorrect. A range of catalysts was seen but many did know the correct one. In part (d)(iii), far too many students thought that covalent bonds were broken during melting. When students realise that the van der Waals forces are broken they must state that these forces are between the molecules. In a few answers, students referred to van der Waals bonds breaking and this is unclear. The IUPAC name in part (e) proved difficult for many students, especially the numbers of the substituent groups. The type of isomerism in part (e) was well known by most students; the most common incorrect answer was positional isomerism.

Question 6

The number of correct answers to the unstructured calculation in part (a)(i) was pleasing. However, many students lost marks because they did not use the stoichiometry in the equation to answer the question. Over half of students scored both marks in part (a)(ii) but attempts by the rest were varied. Some could not calculate the M_r correctly, some forgot to multiply by 100 and a few obviously did not know what was meant by the term atom economy. The equation in part (b) was found to be difficult by many students; the biggest error involved an incorrect formula of calcium hydroxide and consequently an incorrect equation. The empirical formula calculation was well done by many students but some scored zero because they did not involve calcium in their working.

Question 7

Answers to part (a) showed that there are still many students who cannot work out the correct shape of an unknown molecule. The main error was drawing the incorrect number of lone pairs and this led to an incorrect name and angle in the molecules. As always, this type of question discriminated very well. In part (b), many students could not identify the correct type of bonding

and, therefore, could not score any marks. Many others who could identify the correct bonding then contradicted themselves by referring to intermolecular forces in the crystalline solid.

Despite the formula TlBr being given, many students could not write a balanced equation in part (c). Many did not realise that bromine is a diatomic molecule and others showed the formation of the product from ions.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator