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General Certificate of Education

Chemistry 1421

CHEM2 Chemistry in Action

Report on the Examination

2010 examination - January series

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Dr Michael Cresswell Director General.

General Comments

The questions in this unit often use contexts designed to consider "How Science Works". Candidates tackled these questions better than they did in June 2009, perhaps because they were expecting this approach.

Full marks were seen on every question and there was no evidence that candidates ran out of time to complete the paper. The lower achieving candidates had ample opportunity to show what they could do and the higher achieving had adequate challenge.

Many candidates found writing chemical formulas and constructing chemical equations difficult.

SECTION A

Question 1

This question took hydrogen as its theme and asked questions across the subject. Overall it was a high scoring question. The application of Le Chatelier's principle was done well with only 10% of candidates failing to score any marks. By contrast, the calculation of a value for the H-H bond enthalpy proved very demanding and half the candidates scored no marks.

Question 2

Only 20% of the candidates stated that enthalpy change is the heat change at constant pressure, even though this is stated clearly in the specification. It was pleasing to see that more than half the candidates could correctly apply Hess's Law to an unfamiliar cycle and arrive at the right answer for the specified enthalpy change.

Question 3

This was generally high scoring apart from part 3(d) for which only two thirds of the candidates gave the correct answer.

Question 4

All parts of this question discriminated well. It is a matter of concern that more than half the candidates were unable to write a correct equation for the reaction of magnesium with titanium(IV) chloride.

Question 5

This question discriminated well, although the oxidation states in part 5(c) proved very straightforward for a high proportion of the candidates.

Question 6

Recognising functional group isomerism in part 6(a) proved difficult for many candidates whereas testing for an aldehyde was generally done well in part 6(b). The free-radical

substitution in part 6(d) produced a wide range of marks and only the best candidates scored full marks. The use of precise M_r values in part 6(e) was new and only 38% scored any marks.

Question 7

Candidates are able to tackle organic reaction mechanisms with confidence and this question was well answered. The most demanding part was part 7(a)(iii) in which they had to indicate that the carbon-bromine bond was polar.

Question 8

Some very good answers were seen for all parts of this question, but candidates were too often let down by their inability to construct balanced equations. Almost half did not balance the equation in part 8(a)(i) where all of the formulas were given.

SECTION B

Question 9

This question was probably the most discriminating. Only the very best 10% were able to score full marks in part 9(a); the commonest error was the failure to draw all of the bonds in a displayed formula. In part 9(b) the fingerprint region was well known but only the best 15% stated the need to seek a match between the infrared spectrum of the isomer and a known spectrum. In part 9(c) poor equations and incorrect or imprecise formulas often marred otherwise good answers. Part 9(d) proved to be high scoring, but only 6% of the candidates were able to access all of the marks.

Question 10

This question took chlorine as its theme and asked questions across the subject. Part 10(a) proved to be the most demanding question on the paper. Many candidates believed that it was HClO that was responsible for the green colour and this meant that they could make no progress in answering the question. In part 10(b), candidates had more success and this question gave the full range of marks with only 5% failing to score any marks. Part 10(c) also proved demanding, but almost half the candidates scored at least two of the marks, with the equation causing the greatest problem for many. Part 10(d) was well answered and discriminated well with 88% of the candidates scoring some marks and 30% scoring full marks.