



UK Chemistry Olympiad 2014

Examiners' Report, Round 1, 2014

The members of the RSC Olympiad Working Group would like to thank teachers for their hard work supporting students and the Royal Society of Chemistry to run Round 1 of the competition. The members of the working group were pleased to receive letters and emails from teachers about the administration, content and demand of the Round 1 paper and have taken on board this welcome feedback.

We were delighted to see another significant increase in participation in 2014. This year, 5682 students' marks were entered into the online score submission system, which represents a 24% increase from entries in the 2013 competition. We were especially pleased to see that 135 schools had participated for the first time. The RSC will, as usual, be awarding the INEOS prize to the best performing new state school – the student who achieves the highest mark from an eligible school (not entered more than once in the past five years) has won £1000 for their school chemistry department to spend on enhanced equipment or materials to help promote chemistry.

Whilst the paper has always been written with upper sixth form students in mind, we encourage ambitious lower sixth form students to enter if they have been able to cover the required topics in their independent study. This year we received entries from some students in Year 11 and one student in Year 7! His score was very respectable indeed.

Question 1

The examiners felt that this was a fairly straightforward opening question, although some students struggled to balance the more complex chemical equations. There were some unfortunate and trivial errors when students struggled to apply their understanding of valency, giving rise to some incorrect formulae, such as NaCO_3 . Parts e(i) and (iii) caused some difficulty for weaker students.

Question 2

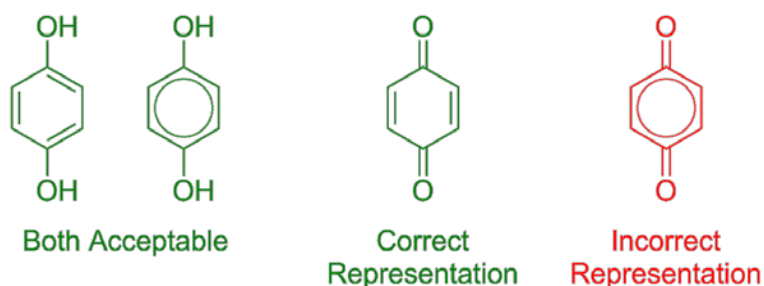
This question was well answered on the whole with many candidates scoring well on the first part of the problem. The final ionisation energy calculation proved the most challenging aspect. It was surprising to see that some students used subscripts in their electron configuration notation, and the sub-level from which sodium loses an electron was often given as $3s^1$ instead of $3s$. Students sometimes quoted negative energy changes and in part e gave the expression the wrong way around, losing one mark.

Question 3

Many students had difficulty calculating the correct concentration but it was noticed that students who made an attempt at drawing structures of intermediates often scored some marks. The examiners were pleased to see that students who struggled to get the correct answer for the first structure were able to succeed with some of the later structures, because organic synthesis questions in Round 1 are always written in such a way as to give students a variety of access points into the question. Some students ignored the symmetry of the two methyl groups when predicting the number of NMR peaks and it was noticed that classifying the reaction type was not so well answered.

Question 4

This question was generally well answered at the start. In part c(ii) many students ignored the dilution factor in their calculation. The majority of students were able to correctly assign the IR peaks whereas for some using the nmr data was more challenging, there were a large number of students able to identify compounds A and C. An important point to note is that whereas the hydroquinones in the last part of the question (A and C) can be represented with either alternating single and double bonds or a circle of delocalised electrons in the ring, the quinones (B and D) are not aromatic structures and so double bonds must be drawn in the correct places. A number of students who got this far fell into this error, as did some teachers in their application of the mark scheme.



Question 5

Many students struggled to answer the combustion analysis part which was presented in a slightly unfamiliar way and it was noted that some candidates were unable to finish the question due to time pressures in the time allowed. However, it did allow for the more mathematically minded lower sixth candidates to score high question marks with many being able to answer beyond the initial combustion analysis section tackling the ideas on density and % packing with ease. Most students who had managed their time effectively and were able to tackle the Hess Law question were able to pick up some marks and this was generally well attempted.

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