

UK Chemistry Olympiad 2015

Examiners' Report, Round 1, 2015

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 2015. This year, 6630 students' marks were entered into the online score submission system, which represents a 17% increase from entries in the 2014 competition. There were a number of excellent entries from Lower 6th Students and it would be hoped that these students would be strongly encouraged to enter the C3L6 written paper later in the summer.

We were especially pleased to see that 137 schools had participated for the first time. The Royal Society of Chemistry 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. In addition prizes are awarded to the top performing student in the competition, who achieved a score of 74/75. The top scoring Lower 6th chemist is also awarded a prize. It was noted that many of the top scoring students had previously participated in the C3L6 Lower 6th written paper and it was pleasing to see that they have continued to participate in chemistry competitions.

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.

Question 1

The examiners felt that this was a fairly straightforward opening question. There were some trivial errors with students not able to apply their understanding of valence and also using the incorrect chemical symbol for indium, which gave rise to incorrect formulae. Less mathematical students seem to find part b) more challenging but parts c) and d) were generally well answered and many students seemed to have a good understanding of unit cells. Again most students made good attempts at parts e) and f) and it was pleasing to see what many wrote out the full balanced equation for part f) although this was not needed for the mark to be awarded.

Question 2

Part a) was generally very well answered. It was noted that part b) only the very best students scored full marks. The best students spotted 4 isomers but very few appreciated that there were different enantiomers. Part c) was well answered provided that students considered the valency of carbon. Even some of the top students failed to appreciate that the transition energy was required $E_{J=39} - E_{J=38}$, and there were a number of careless mistakes with units.

Question 3

It was noted that students who attempted to draw the structures of the intermediates often scored some marks, and that some students approached the question by working backwards from the final product which was pleasing as organic synthesis questions used in Round 1 are designed to give students a variety of access points into the question. The higher ability students were able to deduce the functional groups and assigned the IR frequencies correctly from information given in the question.

Question 4

This question asked students to apply Michaelis-Menten kinetics (a 2nd year university topic) in a reasonably accessible way to one of the more prevalent examples of zero order behaviour. Part a) was generally well answered by most students who recognised that NAD⁺ had been reduced. There was a good attempt at part b) by many students although part c) onwards was often only tackled by the most able students. It was noted that even among the top performing candidates, many thought that the reaction was 1st order in part d) but went on to use the zero order expression later in the question. Many of the correct answers for the calculations fell into the acceptable range as indicated on the mark scheme. Many candidates were able to score marks for part f) despite not getting part d) correct. There were many interesting spellings noted for the compound in h) and it was noted that H₂O₂ was often suggested by students, despite it not containing any carbon atoms. Part i) was generally answered well, although students often ticked contradictory statements.

Question 5

It was noted that some students were unable to finish the question paper due to the pressures of the time allowed, however, those students who did attempt this question scored well on parts a), b) and e). A number of students were not able to cope with the concept of δ in parts c) and d) and $\delta/2$ often appeared in incorrect answers. Those students who did attempt f) - h) often achieved very good marks, sometimes consequentially.

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