UK Chemistry Olympiad 2013

Round 1 - Examiners' Report

The members of the RSC Olympiad Working Group would like to thank teachers for administering Round 1, marking the papers and submitting the scores using the new online system which significantly increased the efficiency of processing candidates' scores. The quality of marking on the sample of papers seen by the working group was very high with some teachers annotating scripts to show why marks had or had not been awarded. There was also evidence on some scripts of internal moderation before scripts were submitted to the RSC, which was pleasing to see.

We were pleased to see 113 new schools participating in the competition for the 1st time and we look forward to seeing them continue to participate in future years. There was a significant increase in entries this year for round 1 with almost a 1000 more entries this year compared to 2012.

This was certainly a challenging paper, as indicated by the thresholds required for Gold, Silver and Bronze certificates (see graph at end of document for full details of mark breakdown). Questions 4 and 5 proved to be the more demanding questions for students. Many candidates found managing their time very hard, causing them to rush the final two questions, possibly missing accessible marks.

Question 1

This question was accessible to all students, including those in the lower sixth form (or equivalent). This question about amount of substance and energetics was generally well answered, with most students scoring some marks. Oxidation numbers were well understood. The main errors were the incorrect use of positive and negative signs. Part c iii highlighted the need for many students to carefully check units during and after calculations.

Question 2

This physical chemistry question examined amount of substance, gases and volumetric analysis.

Many candidates successfully negotiated the quantity algebra but slipped up with trivial points like molar masses for oxygen and nitrogen gases and remembering to double the volume of gas in a bike tyre to obtain the gas volume for the whole bike. During moderation of the best scripts, many students were awarded Error Carried Forward marks that had not been awarded by their teachers.

Question 3

This question was written to assess students' knowledge of common coloured compounds and ions. In general, part b was answered more confidently than part a.

Only the highest achieving students scored full marks on part a, with many students not realising that $CuSO_4$ is white unless it is hydrated. Many students were not familiar with VSO_4 (or V^{2+} more generally) but were sometimes able to assign this to the colour violet by a process of elimination. Some students suggested two or more substances because they felt a redox reaction might be necessary to obtain the correct colour but redox reactions were not necessary for any colour.

Part b was based on a practical task that is commonly seen in the International Olympiad Final and proved to be challenging for the majority of students, despite the fact that they would have come across the majority of these reactions as part of their course. Students who applied a logical approach, starting with the reactions that produced a 'tell-tale' observation (i.e. other than a white precipitate) fared better than most.

Question 4

The first mark of the question proved tricky with many candidates not using the idea of moles in conjunction with yield to determine the mass of 4-chloroaniline. The most successful approach followed the normal skills required in the Olympiad with many candidates deducing the structures of A-F. Many candidates scored marks with error carried forward in this section which showed good deductive reasoning and logic. Students who persevered with this question were often able to access marks towards the end of the question, despite finding the middle parts of the question hard. A large proportion of candidates easily determined the reaction classification in the final part of the question.

Question 5

Miscounting hydrogen atoms and ignoring the water in the monohydrate were common errors when working out the molecular formula in part a. Many students could correctly identify which amino acid made up which part of the creatine molecule. Not many students realised that the integration data on the NMR trace could be used to calculate a value for K_c. Only the very best candidates were able to propose a sensible structure for the final part of the question.

Supported by an unrestricted educational grant from

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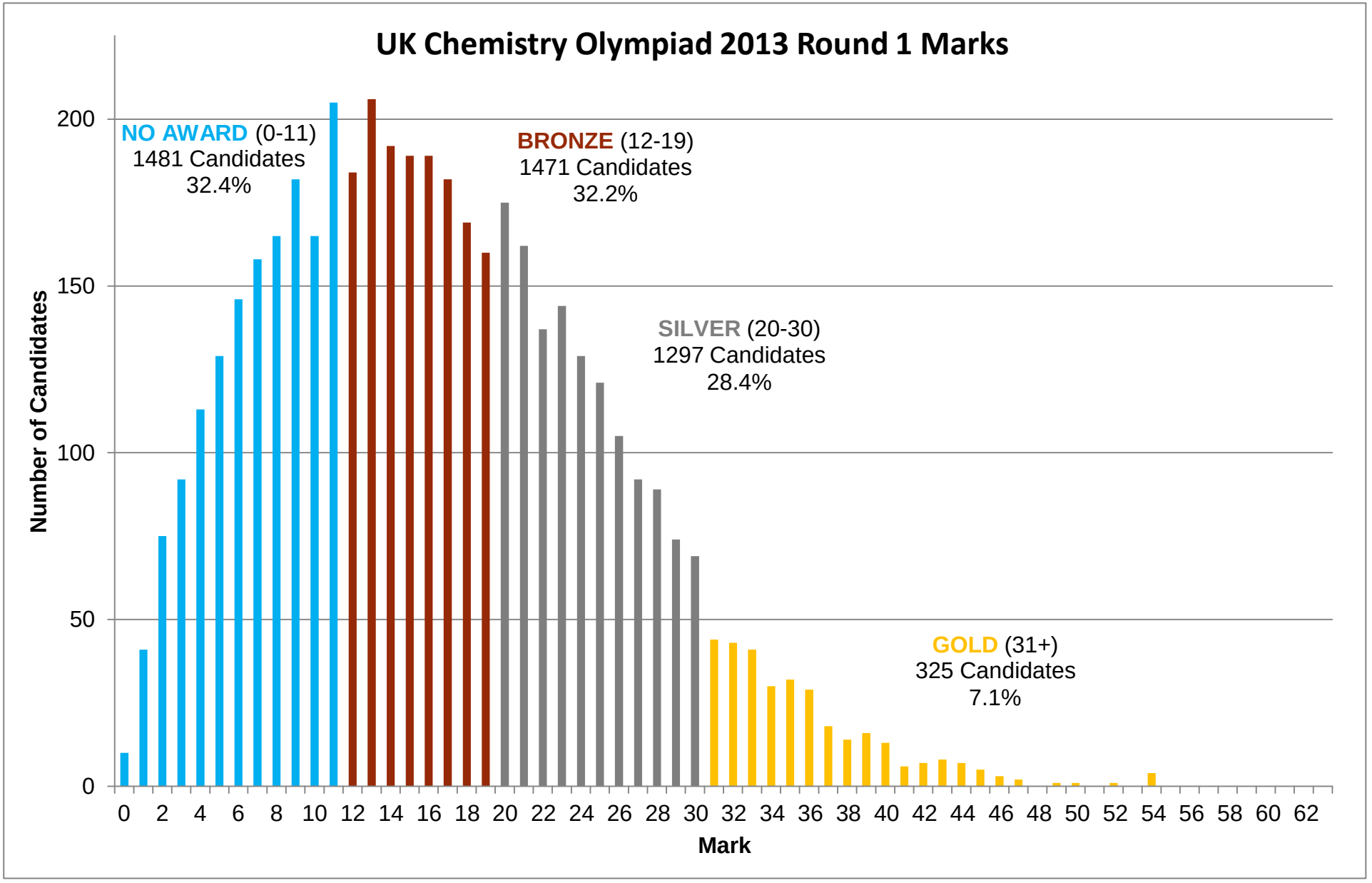
UK Chemistry Olympiad 2013 Round 1 Marks
NO AWARD (0-11)
1481 Candidates
32.4%
BRONZE (12-19)
1471 Candidates
32.2%
SILVER (20-30)
1297 Candidates
28.4%
GOLD (31+)
325 Candidates
7.1%
Number of Candidates
0
50
100
150
200
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62
Mark