

## REPORT ON THE CHEMISTRY OLYMPIAD ROUND 1 PAPER 2008

The number of schools registering this year was up 10% on last year, at 404. Of these, 284 schools took part, and the total number of scripts received was 1354.

We received a number of comments from schools about this year's paper. Some welcomed an interesting/challenging/engaging paper, whilst others thought it was much more demanding/less accessible than in previous years. I think we accept both of these comments.

This was a hard paper. Many candidates were not used to being asked to think about Chemistry rather than just reproducing material they have been taught. Ours is a different paper from A-level, so not all candidates who achieve high marks at AS can expect to excel in the Olympiad as well. There is no doubt that practising previous papers will help, so next year we will produce a small leaflet with guidance about how to approach our questions.

There was a wide distribution of marks, from 60/62 (amazing!) down to single figures. Although candidates are used to getting 90%+ at A-level, a mark of 70% may get you a first at university, and a score of 50% is good in the Olympiad.

We believe that there were some 'easy' marks in each question, and every part of every question was answered correctly by someone. But there were some 'dreadful errors', with Al-Al covalent bonds, for example, and groups attached in completely random order in the synthesis question.

After re-marking all the top-scoring papers 23 names were chosen to be invited to Round 2. Gold certificates have been awarded to scores of 31 and over (about 12.5%), silver to 22 – 30 (about 24%), and bronze to 15 – 21 (about 29%).

143 Lower Sixth students entered this year, and 10% of these achieved gold medals. The 16 best performing Lower Sixth students have been invited to take part in a training event later this year.

Comments on individual questions are given below.

### **Question 1: Silicon**

This should have been the most accessible question on the paper with some relatively easy marks at the start and only the last part (d) difficult.

We were surprised with the range of bond angles suggested for silane (anything from 90 through 104 to 120°). Several candidates thought that trichlorosilane was  $\text{SiCl}_3$ . In common with many questions, too many candidates didn't read the question carefully and wrote equations for reactions which were not the ones given in words.

### **Question 2: Mushrooms**

Ergosterol is a key natural product, but many candidates seemed to be put off by its size. If candidates can identify one chiral centre in it, however, they should be able to detect all of them (even if there are 8!). The later parts of this question were accessible to candidates who were good at Mathematics as well as Chemistry.

### **Question 3: Mercury fulminate**

We liked this question because of its 'quite tricky' synthesis, but candidates found it unexpectedly hard. Marks were perhaps the most disappointing on the paper, and few got it completely correct.

We were deliberately not very helpful and gave too much data in the question and asked candidates to select the relevant values; this is an important skill for scientists. Some attempted to write an equation for its combustion rather than detonation.

#### **Question 4: Aluminium chemistry and rat poison**

This was a question of two parts: up to (d) should have been very easy, but the last three parts were very tricky! We were shocked by so many Al-Al covalent bonds in the structure for A. We accepted wither the number of outer-shell electrons or the total number of electrons around the Al atom in the structures of  $AlCl_3$  and  $Al_2Cl_6$ .

#### **Question 5: Cone snails**

A surprisingly large number of students got this completely right which was very pleasing, although a common error was to confuse leucine with isoleucine. 'Easy marks' were available again for calculating masses of polypeptides and ions, but these were not scored by all. Many candidates seemed scared by this question, perhaps because it was 'biological' or perhaps because the molecules were 'big'. We would encourage students to think of such molecules as small reactive 'bits' with irrelevant big 'bits' coming off them!

#### **Question 6: Fexofenadine**

This was another problem where some students were frightened by big structures when we hoped they would be able to place different groups onto the starting material in correct places (rather than in random positions!) by looking at the structure of Fexofenadine they were trying to produce. Many candidates got the correct molar mass of 77 for the side chain in the structure but then came up with nonsensical organic groups such as  $CH_{65}$ ! Good candidates tended to get A to D, and F to G, although some got one set without the other.