

An Indian summer for 33rd Olympiad

Mumbai, formerly Bombay, in India, was the setting for the 33rd International Chemistry Olympiad for two weeks in July. Amidst the steamy heat and incessant noise of traffic, not to mention the occasional monsoon storm, the UK team of four A-level students competed successfully, each returning home with a medal and an experience none is likely to forget. Jung Lee (Chiswick Community School, London), Maxim Kahn (Queen Elizabeth's Boys School, Barnet), Thomas Daff (King's School, Grantham) and Alexander Lewis (Manchester Grammar School, Manchester) were awarded a silver and three bronze medals respectively, finishing in the top 20 of the 54 countries taking part.

What's involved

From humble beginnings, the competition has grown into a truly international affair. The first International Chemical Olympiad took place in 1968 in Czechoslovakia: three countries entered teams of four students. This year 54 countries entered and another six observed with the view of entering next year.

The format of the Olympiad, however, has remained essentially unchanged. The students compete as individuals, taking a five-hour theory paper and a five-hour practical test. It's not all hard work though. There's plenty of time for the students to meet and socialise with other students and experience the delights of the local culture. The social agenda this year included a trip to the Nehru Centre and Planetarium, Bhabha Atomic Research Centre, some Buddhist caves in the hills north-east of the city, and Es-selworld, Mumbai's answer to Alton Towers.

The syllabus for the Olympiad comprises a wide range of topics under the headings of inorganic, physical, organic, biochemistry and 'other problems', which includes analytical chemistry, theoretical chemistry, instrumental methods of determining structure – UV-VIS, MS, IR, NMR and X-rays – and polarimetry. The level of the topics varies from post-16 secondary school chemistry (levels one and two), to first-year, bordering on second-year degree level (level three). The host country for the event selects topics from the syllabus and produces a set of questions and a practical similar to those it intends to use in the actual competition. These are published in a booklet, *Preparatory problems*, which can be accessed via the RSC's Learnet website (www.chemsoc.org/networks/learnet/olympiad.htm). Any questions that the host intends to set at level three are accompanied by worked examples in this publication.

Under the chairmanship of Professor N. Sathyamurthy (Indian Institute of Technology in Kanpur), India produced a set of preparatory problems covering a fairly broad spectrum of topics set around interesting contexts wherever possible. In the actual competition the Indians served up a dish of context-based theoretical problems. There was, for example, an organic problem based on different spices used in Indian foods: the students had to work out the chemical structure of the spices given their nmr data and formulae, and then had to propose a synthesis for each spice. Another problem involved the beach sand mineral monazite, found in the state of Kerala: the students had to investigate the radioactive decay of thorium found

in the mineral. In the five-hour practical the students were faced with three different problems: the preparation of 2-iodobenzoic acid using a Sandmeyer reaction; the estimation of quantities of Mg and Mn in a given sample via the formation of a complex; and the determination of the rate of a reaction by titrimetric analysis.

UK team selection

Keen to encourage all schools in the country to put forward entrants to the Olympiad, the RSC runs a national competition each year to select the UK team. The 'chosen four' would have come through two qualifying heats. The first was a two-hour school-based test set by the RSC's Olympiad Selection Committee, and taken in the spring term of Y13 in England, Wales and Northern Ireland, and in the sixth year in Scotland.

Some 1000 students entered the first round this year. Schools and colleges can send in up to five papers for external marking and the top 50 papers are remarked by the committee to choose the top 10 to go through to round two – a 'weekend away', this year at the University of Keele. The students do a theory exam and a practical similar to what they are likely to experience at the Olympiad itself. The RSC sends these students a copy of both its spectroscopy CD-ROM and its practical techniques CD-ROM, as well as a reading list and a note of any subjects that might come up that are outside the A-level syllabus. The top five of these candidates are then selected to go on two 'training weekends', this year held at St Catharine's College, Cambridge – the top four represent the UK in the international competition, the fifth gets the opportunity to go to the London International Science Forum (two weeks of sheer indulgence in science).

Accompanying persons

This year the UK team was accompanied to Mumbai by two 'mentors' – Sue Rayner, a chemistry teacher at Fitzharys School in Abingdon, Oxford, and Dr Tony Curtis from the chemistry department at the University of Keele – and a scientific observer – Dr Peter Wothers of St Catharine's College, Cambridge. Wothers is on the International Steering Committee, which met in India to discuss, among other things, the aims and rules of the competition generally, and future venues for the competition.

The mentors had their work cut out for them. After the opening ceremony, enlivened by a cultural programme of Indian dancing, they broke off all communication with their students (until after the exams), and set to work. First they inspected the labs and equipment to ensure that everything the students needed to do the practicals was there and suitable; if not they would have had to find suitable alternatives. They then discussed the practical paper with mentors from the other participating countries to make sure the experiments could be done, and agreed on any amendments necessary. They then proof-read the paper. The working language of the competition is English, but an element of translation would have been necessary. The mentors went through a similar process with the theory paper.

After the students had sat the exams, the mentors marked their papers, and discussed



From left: Alexander Lewis, Jung Lee, Maxim Kahn and Thomas Daff

the results with the chemists who had set the papers and who also marked them to agree on final marks. A separate jury met to decide the mark boundaries for the medals: the top 10 per cent were awarded gold, the next 20 per cent silver and the next 30 per cent bronze. Peter Wothers told *Education in Chemistry*, 'The fact that all our students got medals is very good. The level of many of the questions was beyond our [Cambridge] first-year standard chemistry exam and so the students did very well'. 'It's worth remembering', he added, 'that for some countries, notably Russian-speaking countries, Austria and China, the Olympiad forms part of their national education structure and as such there are incentives for the students to do well. In some cases they automatically get a place in a university, or they may be excused military service if they win a medal'.

RSC looks to the future

The RSC is currently developing a lower sixth web-based competition for July 2002 after the students have done their AS exams, when they have a bit of spare time. Dr Maria Pack, assistant education manager, schools and colleges at the RSC, told *Education in Chemistry*, 'the idea is that the competition will be online for a couple of weeks, and will comprise short questions and answers, in a multiple choice or short statement format, and students will be able to fill in their answers online, which should make marking easy. Students will be able to enter the competition more than once; they can go away and look up/investigate the answer, thus enhancing their learning. However, the questions and answers will come up each time in a random order so the students will have to know the right answer'. Pack added that all those who enter the online competition will be sent details of the International Olympiad so that they can register for the competition. Until now students have been put forward by their teachers. The RSC will then contact the students' teachers with further details of the competition and ask them to support their students. From 2002, students will be able to register for the Olympiad online at <http://www.chemsoc.org/networks/learnet/olympiad.htm>.

The venues for the next six Olympiads are, in order, Groningen in the Netherlands, Greece, Switzerland, Chinese Taipei, Korea and Turkey. Meanwhile the four UK team members are preparing for university. All four have offers from Oxbridge, and three are hoping to pursue a career in chemistry. *Kathryn Roberts*