

AMERICAN CHEMICAL SOCIETY

# Going Green

Integrating Green Chemistry into the Curriculum



## European Summer School on Green Chemistry

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The Summer School on Green Chemistry, devised by the Italian Interuniversity Consortium "Chemistry for the Environment" (INCA, <http://www.unive.it/inca>), is a high-level training school for young (graduate and postgraduate) chemists. Its purpose is to teach the design of intrinsically clean chemical processes that can solve pollution concerns at the source. The innovative approach lies in teaching future generations of researchers how chemistry can be used to prevent pollution, particularly as an alternative to the cleanup of waste, which is costly economically and in terms of health, safety, and the environment.

The summer school became a reality in 1998 with a grant from the European Commission's IV Framework Programme Training and Mobility of Researchers. Currently, the Summer School on Green Chemistry is part of the "Improving the Human Research Potential and the Socio-economic Base" program. The director of the European Summer School on Green Chemistry is Pietro Tundo, president of INCA. The summer school has run yearly, and 2004 will be the seventh edition. Additional funds to cover participation of students from the Russian Federation and

Latin America have been provided by the Italian Ministry for Foreign Affairs. Admitted European, Russian, and Latin American students benefit from complete scholarships.

This innovative approach to the design of clean chemical reactions and processes proved attractive to young scientists, as was immediately obvious from the growing number of applicants year after year. In 2003, 90 applications were received for 60 available slots. Participants, whose ages ranged from 25 to 35, represented both academia and industry.

The first six editions of the school were a valuable occasion for a large number of scientists to interact in a very constructive manner. The exchange allowed for a valuable transfer of information and created a network of students who are still in contact on the subject of green chemistry. The program also raised awareness of the need to disseminate the concepts of green chemistry throughout the chemical community.

As far as teaching is concerned, the schools usually consist of a total of 10 to 12 lectures (two to three daily), plus ample discussion time, a poster session, awards for posters, and some practical problem-solving sessions. Topics covered at the summer school include:

- Principles and state-of-the-art green chemistry;
- Waste minimization and atom economy;
- Green reagents, feedstocks, and products;
- Alternative reaction conditions and solvents;
- Green industrial catalysis and biocatalysis.

The atmosphere is informal, thanks also to the help of social dinners, very cooperative groups of teachers, boat trips around Venice, mixers, etc., effectively making the schools pleasurable as well as beneficial. Beautiful Venice certainly contributes to attract participants and to make their stay pleasant.

The updated edition of the book titled *GREEN CHEMISTRY – A Collection of Lectures from the Summer Schools on Green Chemistry*, edited by the INCA Consortium, was distributed to the students attending the summer school. This volume was a product of the first four editions of the schools. It was used as a textbook for the fifth edition, and its updated versions, made for each series of summer schools, will continue to be the textbook in the future. These updated scientific contributions of international level scholars are available all over the world thanks also to the electronic version available for free download on the web site <http://helios.unive.it/inca/pubblicazioni.htm>.

Finally, the 2002 edition prompted the school's organizers to submit a proposal for the creation of a Marie Curie Research Training Network within the European Commission's VI Framework Programme on the topic of green chemistry. The experience gained from organizing the summer school, combined with the large network of green chemistry practitioners that has emerged, provides fertile ground for further dissemination of green chemistry. If the proposal is evaluated positively, the Marie Curie Research Training Network will improve the quality and increase the amount of green chemistry research throughout Europe. It is hoped that this growing consciousness of the benefits brought by green chemistry will also reverse the trend of fewer graduates in the chemical disciplines throughout the continent. The Summer School on Green Chemistry is a steppingstone in the career of many young researchers wishing to combine state-of-the-art research in chemistry with environmental awareness. ●