

Chemical Education: Responsible Stewardship

Following on a recommendation from the Organization for the Prohibition of Chemical Weapons (OPCW) and IUPAC that emerged from a joint workshop held in Oxford, England, in July 2005, titled "The Chemical Weapons Convention (CWC), Chemistry Education and Professional Conduct of Chemists," a new project was initiated to promote codes of ethical and professional conduct among chemists and chemical engineers and to share the experience of these new teaching practices.

To jump-start this project, the Chemical Education: Responsible Stewardship conference was organized last October at the D. Mendeleev University of Chemical Technology of Russia in Moscow. This conference focused on the dissemination of new information in the field of education responsible for stewardship and the promotion of all aspects of chemistry among members of the profession as well as the worldwide community. One hundred fifty scientists and educators from Russia, UK, Italy, Canada, USA, India, and CIS countries participated. Leading experts in the field of chemical education and CWC also took part.

The conference was organized under the auspices of IUPAC, OPCW, the Scientific Council on Problems of Ecology and Emergency Situations of the Russian Academy of Sciences, the Nature Management and Environmental Preservation Department of the Moscow Government, the National Committee of Russian Chemists, and the Institute of Chemistry and the Problems of Sustainable Development, D. Mendeleev University of Chemical Technology of Russia. Additional support was received from the Moscow Committee on Science and Technologies, the Fund of Intellectual Technologies, and the Russian Regional Environmental Center.

Raising Awareness of the CW

Another IUPAC project has been recently initiated to develop educational material for chemists and chemistry teachers about the Chemical Weapons Convention (CWC). The material will start with the beneficial use of chemicals and raise awareness about the possible misuses of chemicals.



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More than 70 lectures and 50 posters were presented at the conference, which consisted of one workshop, three symposia, and one roundtable discussion. The following key areas were addressed:

- Chemical Synthesis: The Point of Bifurcation
- The Social Responsibility of Chemists: The Codes of Conduct
- Green Chemistry for Megacities
- Industrial Safety: Chemical Aspects

Chemical Synthesis: The Point of Bifurcation

The objectives of this workshop were to prepare educational materials for use by university and high school chemistry teachers. The materials will equip educators to run workshops on multiple uses of chemistry and the need for CWC. Among workshop participants were lecturers and teachers from high schools and universities interested in receiving information on new methods and technologies of chemical education dealing with responsible stewardship. Four working papers (in English and Russian) were distributed to incite discussion in the following areas:

- Multiple Uses of Chemicals
- Chemicals—Good and Bad
- Toxicology of Chemical Warfare Agents
- The Prevention of Chemical Weapons: What Is the Role for Codes of Conduct?

The Social Responsibility of Chemists: The Codes of Conduct

This symposium brought discussions on the theoretical and methodological problems associated with such codes of conduct, the problem of elaboration and of teaching said codes, and the implications of carrying out these codes in research and industrial activities. As a result of this session, it was recommended that the Academic Council of the D. Mendeleev University of Chemical Technology of Russia create the representative and competent commission for the development of "The Ethical Code of Chemists."

It also was recommended that the efforts of the wider scientific community be integrated, including representatives of humanitarian and scientific knowl-

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edge, to develop theoretical-methodological problems of sustainable development.

Universities were encouraged to find opportunities to introduce a course on ethics as a compulsory subject and to develop elective courses such as "Professional Etiquette," "Ecological Ethics," and "Ethics of Consensus-Building."

Green Chemistry for Megacities

During this symposium, a considerable part of the lectures was devoted to the legal issue of wildlife management and the social responsibility of experts as well as the problems of licensing. A number of presentations addressed the methodology of teaching green chemistry in high schools and universities. The presentations focused on the ecological monitoring of the city environment as one of the practical applications of the methods of green chemistry.

The following recommendations arose from the sessions:

- Introduce the methods of green chemistry and their practical applications in the ecological monitoring of the environment into the training programs for chemistry and ecology students.
- Consider it necessary to use the scientific and technical capabilities of the chemical community in searching for new methods and directions of green chemistry to solve the environmental problems of megacities.
- Increase the knowledge and awareness of CWC provisions among chemistry students by using the materials presented during the workshop, "Chemical Synthesis: the Point of Bifurcation."

Industrial Safety: Chemical Aspects

Teachers, scientific employees of chemical institutes, and lawyers took part in the last symposium. Their active participation led to the following recommendations:

- Chemical education should bear safety in mind when creating a global outlook for the next generation.
- Ways to maintain chemical safety should be taught in the curricula of high schools and universities.
- Professional training in the field of chemical safety must be considered as one of the major aspects of chemical education.
- Seminars in specific areas of safety for general education (high school, etc.) should be held in order to promulgate the importance of safety for the population.

Overall, the conference made a substantial contribution to the facilitation of the exchange of scientific information and expertise among state parties of the CWC. It contributed to promoting awareness about the CWC and its implementation in the scientific community. It also provided an additional impetus to develop a culture of responsibility and compliance within the scientific community with international norms, including the CWC. The conference objectives were in line with the OPCW's core objectives of promoting the universality of the CWC and of improving national implementation.

Chemical education could be used effectively for this purpose, because chemistry, as a fundamental science and a scientific basis for a variety of technologies in different branches of industry, is deeply involved in the progress of modern civilization. We live in a world completely grounded in chemistry: Everything that we are and do is controlled by chemistry. The next generation of high school textbooks has been produced in different parts of the world, and significant public interest has been expressed concerning the national and international uniqueness of their application. There are many chemical educators, well trained in environmental issues, who would like to move further and contribute to the education for sustainable development.

Published outcomes will be released and announced at a later date. For more information, including list of conference participants and lecture titles, visit the project Web page. For more details, contact the task group chair, Natalia Tarasova <tarasnp@muctr.edu.ru>.

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