helps to create a better world. Among the topics to be covered in the new volume are the following:

- multiphase thermodynamics
- reactive distillation
- thermodynamic properties from *ab initio* quantum chemistry
- molecular modeling
- properties of clathrates
- ionic liquids in separation processes
- calorimetry
- transport properties
- bioseparation
- nano-particles and nano-technology

The volume will be published in 2004 with the Royal Society of Chemistry (UK). The editor is Professor Trevor Letcher, who edited the previous volume (*Chemical Thermodynamics for the 21st Century*, 1999 [ISBN 0-632-05127-2], <www.iupac.org/publications/books/author/letcher.html>). The new collection is aimed at those working in this field as well as general chemists, prospective researchers, and those involved in funding chemical research.

For more information, contact the Task Group Chairman Trevor Letcher <letcher@nu.ac.za>.

www.iupac.org/projects/2002/2002-063-1-100.html

Pesticide Science—Harmonization of Data Requirements and Evaluation

The IUPAC Chemistry and the Environment Division has had a sustained interest in pesticide science. The recent ***IUPAC-Korean Society of Pesticide Science International Workshop on Pesticides*** *was not only an integral project, but it was an occasion for reviewing other IUPAC projects in this field. In this article, Kenneth Racke reports on the workshop.*

More than 300 scientists, government regulators, and industry leaders representing 28 countries gathered in Seoul, Korea, 13–15 October 2003, to participate in the IUPAC-Korean Society of Pesticide Science International Workshop on Pesticides 2003.[1] The theme of the workshop was "Harmonization of Data Requirements and Evaluation."

The workshop was co-organized by the Korean Society of Pesticide Science (KSPS) and the IUPAC Division of Chemistry and the Environment (DCE). Cosponsors included the Korea Rural Development Administration, Korea Institute of Toxicology, Korea Crop Protection Association, CropLife Asia, and several additional national organizations. Dr. Byung-Youl Oh, president of KSPS, coordinated local arrangements. IUPAC contributions were coordinated by Dr. Yong-Hwa Kim of the DCE and myself.

Participants in the workshop had the opportunity to attend 33 invited lectures and view approximately 100 posters. Main program topics included "Pesticide Regulatory Harmonization," "Residue Behavior and Fate," and "Risk Assessment and Management." The program also included 12 IUPAC lecturers from the DCE Subcommittee on Crop Protection Chemistry, who highlighted the findings and recommendations of a number of recently concluded[2,3,4] and ongoing[5,6] IUPAC projects. Lectures were also presented by representatives of the Organisation for Economic Co-operation and Development (OECD), the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency, and Codex.

The workshop addressed pesticide residues on food.

Topics addressed at the workshop were diverse and included research reports on chemistry investigations, establishment of standards (food, water), toxicity characterization, risk assessment (dietary intake, occupational exposure, and ecological impacts), pesticide evaluation schemes, risk indicators and risk reduction, and standard formats for submissions and reviews. It was clear that there is a need to concentrate efforts and resources toward activities with the greatest benefit to all stakeholders. Participants also noted that perhaps the greatest challenges to be surmounted involve legislative and political barriers. A final workshop discussion session highlighted a series of overall observations and future considerations, and these are briefly summarized below.

First, the high-quality **research and monitoring** activities occurring within Korea and the surrounding countries were discussed at the workshop session.

The specific examples clearly employed state-of-the-art approaches toward studies dealing with environmental fate, worker exposure, and residue behavior. In addition, advanced residue monitoring techniques are being applied toward enforcement of regulatory standards for food commodities and water. The technical sophistication of the region was also evident from the more than one dozen research institutes and private contract laboratories that exhibited analytical equipment and advertised advanced testing services, including those conducted according to good laboratory practices. It was clear that continued pursuit of such advanced approaches should be encouraged, but it was also noted that developments must keep pace with rapidly advancing technologies and issues.

International Approaches and Standards

Speakers highlighted the IUPAC-sponsored projects on harmonized approaches to the establishment of regulatory standards for pesticide residues in water and for evaluation of dietary risk of pesticide residues in food.[2,3] Also discussed were highly relevant international approaches, including the OECD harmonized testing guidelines and dossier structure, the FAO product specification process for active ingredient quality and impurity limits, and the Codex maximum residue limits for food commodities. It was noted that countries in the region would be well served by adopting such available approaches and standards where applicable to avoid redundant or barrier-creating efforts. In some instances, however, there is clearly a need for better communication on the part of the international organizations. It was noted, for example, that the Codex Alimentarius Commission is years behind in updating its Web-based database to reflect the most current MRL (maximum residue limits) standards for pesticide residues in food.

Pesticide Residues and MRLs

On one hand, monitoring information indicated a low overall rate of residue limit violations in the marketplace (e.g., 1–2% of samples analyzed). However, even such a low incidence can result in trade barriers within the region and with trading partners in North America and Europe. This is because national regulatory authorities are primarily focused on setting MRLs based on their own good agricultural practices (GAP), and typically give a relatively low priority to consideration of the GAP of current or potential trading partners. Minor crops are a major concern since many have no MRLs established nationally or in importing countries. The value of Codex MRLs as internationally harmonized standards was highlighted and it was noted that national authorities should adopt or reference these whenever possible. A drawback at the moment is that, because of the slowness of the Codex system and heavy focus on reevaluation of older MRLs, the majority of crop and pesticide combinations have not yet had Codex MRLs established. Countries in the Asia-Pacific region were also encouraged to consider the GAP of trading partners when setting national MRLs. Finally, it was noted that a recently initiated IUPAC project regarding regulatory approaches for minor crops would offer future suggestions regarding practical approaches at the national and international levels.[6]

Cooperative Approaches to Research and Regulation

A key example of cooperative approaches was the centralized EU pesticide evaluation system. The system encourages the reduction of barriers and increases harmonization across countries, despite some inefficiencies and growing pains. Within the EU, the various FOCUS (Forum for the Coordination of Pesticide Models and Their Use) working groups offered a particularly striking model for cooperation between government, industry, and academia. During the past 10 years, such cooperation has resulted in significant advances in environmental assessment and fate modeling methods for pesticides. Also noted were the international efforts of FAO, WHO, and IUPAC in bringing together various stakeholders to address scientific and regulatory challenges related to pesticide evaluation. There appear to be opportunities within the Asia-Pacific region for an increased emphasis on cooperative approaches and work sharing. The recently initiated activities of the ASEAN working group on regulatory harmonization offered a glimmer of hope for the type of discussions that will be required.

Transparency and Risk Communication

It was noted that pesticides are one of the most widely and thoroughly tested chemical classes, and that they are generally safe when used responsibly according to label directions. However, all stakeholders in the manufacturer-user chain must combine their efforts to ensure that risks and precautions for workers involved in the application of pesticides are well communicated, particularly for users in developing countries. The extensive testing and regulatory evaluation underlying pesticide approvals is under-appreciated by the public. In addition, the considerable benefits of pesticide use are also often overlooked.

The contributions of crop protection chemistry to world food production, human health protection, prevention of environmental degradation or natural area loss to cultivation, and economic return need to be better communicated to an often skeptical public and press. An example of a common misperception concerns the interpretation of MRLs as safety rather than trade and GAP-control standards.

A book of proceedings containing contributed papers was distributed to all participants. Slide presentations from the presented lectures are also being made available via CD-ROM. Also, some popular and trade publications will be publishing simplified summaries of key workshop presentations.

The IUPAC-KSPS workshop in Seoul was the fifth in a series organized by the DCE since 1988. Past workshops have been held in China, Thailand, Brazil, and Taiwan. Plans for an international workshop to be held in San Jose, Costa Rica, are now being finalized for 2005.[7]

For more information on these projects, contact Dr. Ken Racke <kracke@dow.com>, senior research scientist at Dow AgroSciences in Indianapolis, USA. Racke was chairman of the international organizing committee for the 2003 pesticide workshop and is now the incoming president of the IUPAC Division on Chemistry and the Environment.

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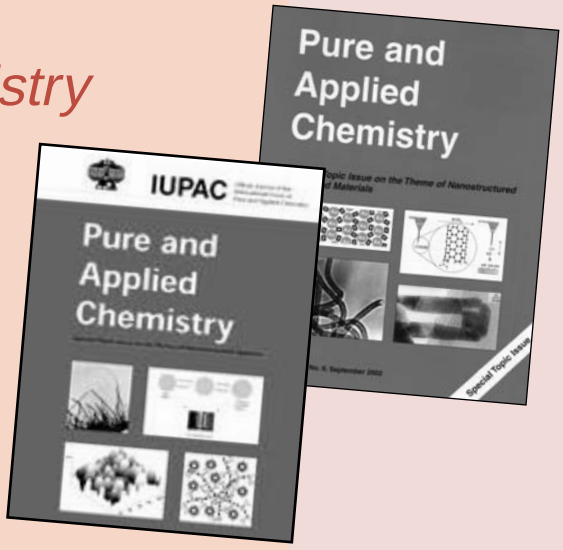

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