IUPAC

Advancing Worldwide Chemistry

Biennial Report 2002-2003

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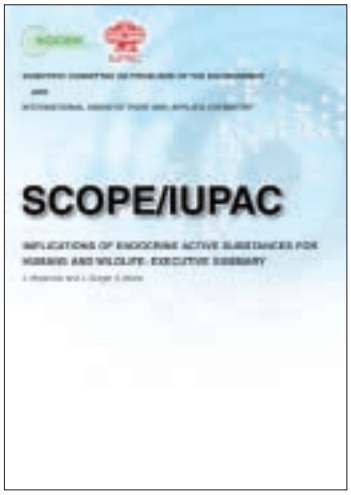
The International Union of Pure and Applied Chemistry (IUPAC) is a non-governmental organization of member countries that encompass more than 85% of the world's chemical sciences and industries. IUPAC was formed in 1919 by chemists from industry and academia. For over eight decades, the Union has succeeded in fostering worldwide communications in the chemical sciences and in uniting academic, industrial and public sector chemistry in a common language. IUPAC addresses international issues in the chemical sciences and provides leadership in standardizing chemical nomenclature and terminology, analytical methods, and atomic weights and other critically evaluated data. IUPAC sponsors a wide range of conferences and projects designed to promote and stimulate modern developments in chemistry, and to support chemical education and the public understanding of chemistry. IUPAC facilitates and encourages international agreements and aids coordination of numerous activities carried out by national and regional chemistry organizations.

This report lists IUPAC's six long-range goals and illustrates actions taken during the last two years toward meeting those goals. The Union's work is done almost entirely by hundreds of volunteer scientists from many countries who serve on IUPAC's committees, subcommittees and task groups. IUPAC's scientific work is conducted largely through a project system in which proposals from chemists worldwide are peer-reviewed and, if meritorious, are approved and supported.

IUPAC receives its core financial support from national subscriptions paid by its 45 National Adhering Organizations—primarily national chemical societies or national academies of science. Additional income is derived from investments of its endowment and reserve funds, from publications, and from grants for specific projects. Approximately half of the 2003 budget of USD 1.3 million went to the operating expenses of IUPAC's Divisions and Committees and to commitments for peer-reviewed projects, primarily travel for committee and project task group volunteers. The other half covered the costs of governance, communications, and a small Secretariat staff.

IUPAC will provide leadership as a worldwide scientific organization that objectively addresses global issues involving the chemical sciences.

IUPAC collaborated with SCOPE (International Scientific Committee on Problems of the Environment) on a three-year project, *"Environmental implications of endocrine active substances: Present state-of-the-art and future research needs."* The project culminated in a symposium in November 2002 in Yokohama, Japan. Over 400 scientists, managers and public policy-makers from 31 countries presented papers on human effects, wildlife effects, exposure assessment, and testing for endocrine active substances (EAS) and endocrine disruption effects. They concluded that the global effects attributed to EAS are not as pervasive or fearsome as some have asserted but that there is sufficient evidence and biological plausibility to leave little basis for complacency in the research community. Well-designed research will cast light on the magnitude of the problem, identify target substances of concern, and advance our knowledge of human and wildlife health. In addition to overall conclusions regarding the current state of knowledge, more than 40 specific research recommendations were developed. The papers and recommendations resulting from the project and symposium were published in a special 900-page issue of the IUPAC journal *Pure and Applied Chemistry* (November-December 2003).



A major new project, *"Impact of transgenic crops on the use of agrochemicals and the environment"* is underway. With scientific, regulatory, political and public perception issues swirling around transgenics, this crucial topic provides an opportunity for IUPAC to take a leadership role in promoting the importance of chemistry in molecular biology.

With the threat posed by chemical weapons gaining increased international attention, IUPAC has undertaken a two-year project to advise the Organization for Prohibition of Chemical Weapons (OPCW) on scientific and technical developments that might have an impact on the Chemical Weapons Convention—a treaty that went into effect in 1997 and has now been ratified by 156 countries. IUPAC was seen as the only organization that has the independence, expertise in chemistry, and international stature to conduct this assessment. A workshop in Bergen, Norway, in July 2002 brought together about 80 leading scientists and chemical weapons experts from 34 countries to explore advances in relevant chemical synthesis methods, chemical processing, and analytical methodology. A report from the workshop was presented to OPCW and the State Parties as input for the first Treaty Review Conference in the Hague in May 2003. IUPAC also provided a briefing for delegates at the Conference. IUPAC emphasized the need for continuing education and updating of equipment at the OPCW Technical Secretariat. This project received significant financial support from several foundations, governmental and non-governmental organizations, and industry.

The CHEMRAWN series of conferences has allowed IUPAC to address issues with important socio-political aspects that transcend pure science. Over the past quarter century, twelve CHEMRAWN

conferences have brought together experts in science and technology, including industrial leaders, government policymakers, academic scientists, and members of the general public. Together they have explored how chemistry, chemical research, and chemical resources can help meet major human needs and solve major problems.

Each CHEMRAWN conference focuses on an issue of global significance. Conference topics have included mitigation of greenhouse gases, sources of cleaner energy, chemistry as a tool for sustainable development, and pollution prevention through the redesign of chemical processes. A conference on water will be held in Paris, France, in June 2004, addressing the adequacy of the supply of pure water and sanitation.

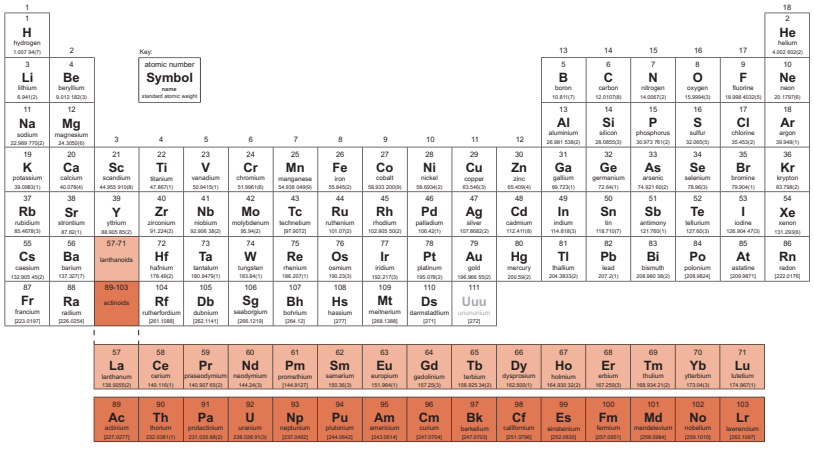
IUPAC will facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion.

IUPAC is recognized as the final authority on the names of elements. In 2003, following wide international consultation, element 110 was officially designated *darmstadtium* (Ds)—the name and symbol proposed by its discoverers at the Gesellschaft für Schwerionenforschung GmbH (Heavy Ion Research Center) in Darmstadt, Germany. Meanwhile, a Joint Working Party from IUPAC and the International Union of Pure and Applied Physics has reported that the discovery of element 111 by the Darmstadt group has now been conclusively established. The process for proposing and selecting a name for this element is underway.

Systematic molecular nomenclature has long been a priority of IUPAC. Electronic communication and computer programs to relate names and molecular structures have made possible an IUPAC/National Institute of Standards and Technology project to devise an algorithm that would provide a unique electronic signature for each molecule related to its structure. During 2003, the project task group completed an algorithm for the *IUPAC/NIST Chemical Identifier* that handles organic, inorganic, and organometallic compounds. A full public version of the algorithm for use by software developers and database compilers is being distributed, and the algorithm has already been incorporated into Chemical Markup Language.

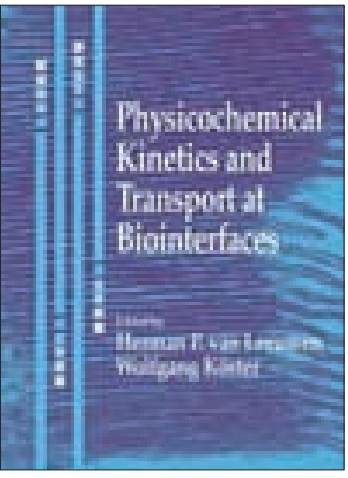
IUPAC sponsored about 60 conferences during the biennium, ranging from the flagship IUPAC Congress and large international meetings on particular areas of chemistry to smaller symposia and workshops on specific topics. In August 2003, in Ottawa, Canada, the theme of the Congress was *"Chemistry at the Interfaces."* It attracted 2500 participants to a wide-ranging program, including lectures by Nobel Laureates, 800 other talks, and 1200 posters. The Congress was cosponsored and organized by the Canadian Society for Chemistry.

A considerable number of other conferences were held during the biennium in many parts of the world, among them the 16th IUPAC Conference on Physical Organic Chemistry in San Diego, USA; the 6th IUPAC Conference on Biomolecular Chemistry in Toronto, Canada; the 14th IUPAC Conference on Organic Synthesis in Christchurch, New Zealand; the 19th International Conference on Photochemistry in Budapest, Hungary; the 29th International Conference on Organometallic Chemistry in Corfu, Greece; the 23rd IUPAC International Conference on the Chemistry of Natural Products in Florence, Italy; the 16th International Conference on Phosphorus Chemistry in



Birmingham, UK; the 2nd IUPAC Workshop on Advanced Materials in Bangalore, India; and the 10th IUPAC International Congress on the Chemistry of Crop Protection in Basel, Switzerland. The 2002 IUPAC World Polymer Congress, held in Beijing, China, attracted over 1000 participants and is recognized as the main event in the international polymer conference calendar. IUPAC also sponsored about 20 other smaller polymer conferences during the biennium.

IUPAC continues to be a leader in the compilation and critical evaluation of chemical data. For example, the book *Physicochemical Kinetics and Transport at Biointerfaces* offers authoritative reviews providing a basis for understanding chemical flows between the living and inert components of the environment. The two volumes in the *Solubility Data Series* published in 2002-2003 presented results from the collection and critical evaluations of original data for solubilities of nitromethane in a variety of liquid solvents and ternary and higher systems of acetonitrile with all other components.



A new review of the atomic weights of the elements also appeared in 2003. The review details the changes and variations that have been recognized in the values and uncertainties of atomic weights on an element-by-element basis, along with an updated table of isotopic compositions of the elements. The review is an update of the standard work published in 1985 and includes a summary of the history of this field with an explanation of methodologies employed.

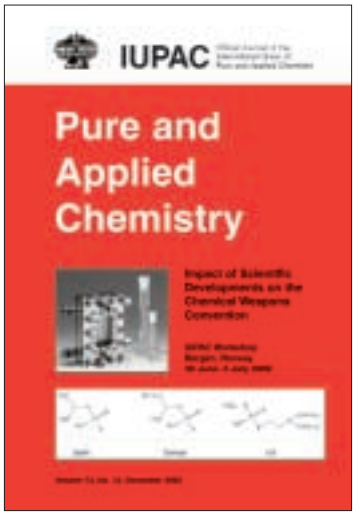
Pure and Applied Chemistry continued to publish Special Topic Issues, with five appearing in 2002-2003. These covered subjects as diverse as Natural Products Chemistry and Nanostructured Advanced Materials.

During the last two years IUPAC projects have led to nine formal recommendations and 30 technical reports published in *Pure and Applied Chemistry*. *PAC Online* makes abstracts and full-text PDF versions of recommendations and technical reports freely available. Also, the online version of the *Compendium of Analytical Nomenclature* (the so-called Orange Book) has been unveiled on the IUPAC web site and immediately began attracting significant attention from web users.

IUPAC will assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life.

From IUPAC's inception, the inclusion of the word "Applied" in its title implied a strong tie to the chemical industry. IUPAC has had a formal program of Company Associates for many years, and its Committee on Chemistry and Industry (COCI) concentrates its efforts on programs and issues of interest and concern to the industry.

Many of the benefits accruing to industry from IUPAC activities are indirect. IUPAC conferences explore new developments in a wide range of chemical science and are well-attended by industrial as well as academic chemists. Likewise, the global issues discussed previously are of crucial importance to industry. The Chemical Weapons Convention provides for routine inspection of chemicals that have a significant positive or negative impact on industry in many countries. Also, the regulatory climate in such matters as endocrine active substances will be based in part, at least, on the available scientific evidence. Thus IUPAC's efforts to provide a sound and unbiased evaluation of the current science has a potential effect on industrial processes and products in many countries.



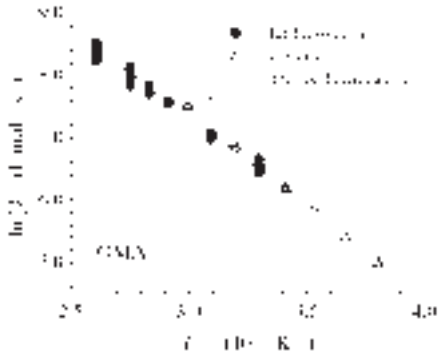
As more of the chemical industry moves to developing countries, the image and viability of industrial chemistry depends increasingly on promoting sound manufacturing and safety practices worldwide. IUPAC, in collaboration with UNESCO, has organized several *Workshops on Safety in Chemical Production,* most recently in Beijing (November 2002). The Beijing workshop drew more than 150 participants, including managers of safety and environment from SINOPEC plants throughout China. It featured speakers from several IUPAC Company Associates on topics from governmental rules and policing to the use of "Responsible Care" to assist in management controls.

In November 2002, a COCI/UNESCO workshop on Safety and Toxicology was held at the premises of the SINOPEC Corporation in Beijing, China.

A complementary IUPAC activity, operated jointly with UNESCO and UNIDO, is the *Training Program for Safety and Environmental Protection.* The responsible individuals at chemical plant operations in developing countries are given free training and subsistence for month-long training periods at major chemical facilities. In 2002-2003, this program supported eight trainees, including individuals from China, India, Kenya, Nigeria, and Uruguay; the host companies were located in Belgium, Japan, South Africa, Sweden, and the USA. Trainees returned to their home countries to disseminate information on safety and environmental protection. A poster session at the IUPAC Congress in Ottawa featured several recent trainees, who described the long-term impact of their training.

Many IUPAC projects relate directly to industrial products and processes, in addition to enhancement of basic research. The program on *Structure-Property Characterization of Commercial Polymers* is an example. This program represents an enormous

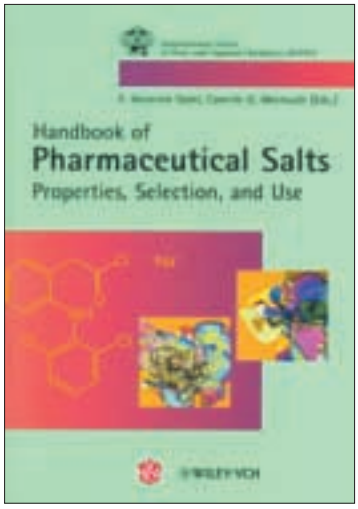
effort, involving 82 task group members from industry and academia in 19 countries, and a sizeable industrial investment in terms of facilities and manpower. Related efforts are underway on molecular characterization of polymers (currently based on evaluating and developing size-exclusion chromatography methods) and on characterization of polymerization kinetics, which deals with modeling and critical evaluation of rate coefficients of free-radical polymerizations of industrial relevance.



Temperature dependence of the propagation rate coefficient for oxiranylmethyl methacrylate (OMA) homopolymerization at ambient pressure. Reproduced from Pure Appl. Chem. 75(8), 1091-1096, 2003.

Conventional wisdom has it that natural products used in therapy are harmless by definition and that synthetic materials are suspect. IUPAC has addressed this misunderstanding and distributed reports for both professionals and the general public. One result of these activities is a report that conveys the message that natural substances are not inherently *safe,* and that "synthetic" does not imply *dangerous.*

IUPAC supports the preparation of glossaries in several fields to facilitate international communication in basic and applied chemistry. For example, the first book on *Pharmaceutically Acceptable Salts for Drugs* is expected to be very important to the pharmaceutical industry.



IUPAC will foster communication among individual chemists and scientific organizations, with special emphasis on the needs of chemists in developing countries.

IUPAC's constituency consists of the entire world of chemistry—organizational and individual. Because IUPAC activities affect chemical organizations as well as individual chemists, the communications challenge is unique. Contacts are maintained with the National Adhering Organizations (the Union's formal members), national chemical societies, industrial companies, and individual chemists.

The IUPAC web site serves as a major vehicle for worldwide communication. News from and about IUPAC and links to national chemical web sites and those of Company Associates provide a convenient means for chemists to remain aware of a wide range of international activities. The bimonthly IUPAC news magazine *Chemistry International* is distributed in print form to chemists in nearly 90 countries and is also available online.

IUPAC's formal and informal ties to other international organizations have an impact on nearly every aspect of individual and commercial society [*e.g.,* the International Organization for Standardization (ISO), the International Committee on Weights and Measures (BIPM), the International Federation of Clinical Chemistry and Laboratory Medicine, the World Health Organisation, and various committees of ICSU]. These contacts permit the voice of chemistry to be heard when international standards in a variety of fields are promulgated.

The names of chemicals, often ignored by chemists who prefer chemical formulae and computer-generated tables, are nevertheless important in the legal and regulatory arenas. Likewise, the standardization of chemical measurement and analytical methods are of crucial importance to commerce and society, often in arenas that seem remote from chemistry. For example, IUPAC's work on nomenclature in laboratory medicine, the C-NPU database, has now incorporated additional areas—immunochemistry, blood banking, and microbiology. An online relational database now comprises more than 22 000 entries. The nomenclature has been translated into several languages and is in regular use in patient records and laboratory information systems—a critical need in a society marked by increasing global mobility of both patients and physicians.

Other IUPAC projects address areas such as the effect of acute dietary exposure to pesticide residues in food—a contentious issue—and regulatory limits for pesticide residues in water. These reports are expected to be influential in international fora such as CODEX Alimentarius.

IUPAC has undertaken a number of projects in developing countries involving various aspects of chemistry. For example, recent and ongoing projects that explain and advocate the use of green chemistry processes are targeted to particular areas—Africa, Latin America, and Southeast Asia. Other projects result in workshops in devel-

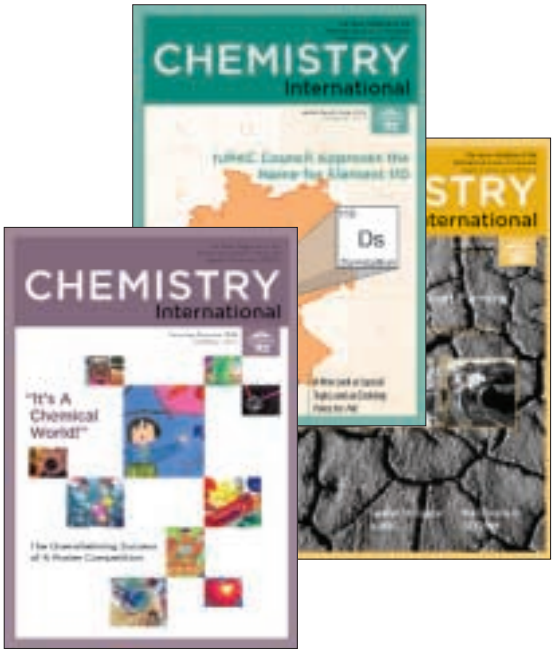
Morton Hoffman, Peter Atkins, Sultan Abu-Orabi, and Paul Walter at the poster session organized during the conference Frontiers of Chemical Sciences: Research and Education in the Middle East, held in Malta, in December 2003.

oping countries designed to update scientists in the region on topics relevant to their needs on food and environmental issues. IUPAC is also making special efforts to encourage scientific conferences in developing countries by providing financial support and by sending eminent scientists to such conferences as *IUPAC Lecturers.*

In December 2003, IUPAC collaborated with the American Chemical Society and the Royal Society of Chemistry in sponsoring a unique workshop in Malta that brought together scientists from the Middle East to discuss potential cooperative projects in research and education in this politically troubled region. Top-level scientists from Egypt, Iran, Israel, Jordan, Kuwait, Lebanon, the Palestinian Authority, Saudi Arabia, Turkey, and the United Arab Emirates joined with scientific leaders—including six Nobel Laureates—from a number of other countries for a program of lectures and informal discussion. Immediate outcomes of the meeting include plans for joint research projects in several countries, a web page to facilitate continuing communication, and invitations for several Middle East scientists to visit laboratories in Taipei and Haifa.

A first-of-its-kind meeting, held in Malta, in December 2003, aimed to foster relationships among chemical scientists from throughout the Middle East.

A major means of communication with the global chemistry community, and beyond, is the Union's newsmagazine, *Chemistry International.* The content and appearance of *Chemistry International* were greatly enhanced in 2002 and 2003 through an emphasis on news about IUPAC for a global audience. In addition, the magazine was completely redesigned for a more attractive appearance.



IUPAC will utilize its global perspective and network to contribute to the enhancement of chemistry education, the career development of young chemical scientists, and the public appreciation of chemistry.

In 2003 IUPAC received an endowment of USD 125 000 from the Samsung General Chemicals Company of South Korea. The interest from this endowment will be used for awards, prizes, and educational bursaries to support young scientists working in macromolecular chemistry. During the biennium eight courses and workshops in this field were sponsored by IUPAC. Also, education programs in medicinal chemistry were held in Latin America and the Indian subcontinent, and a textbook in Spanish and Portuguese on *Practical Studies for Medical Chemistry Students* has been completed.

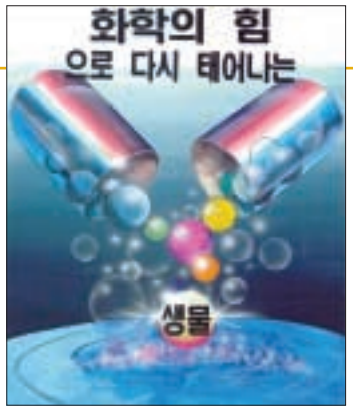
IUPAC President Pieter Steyn presents a plaque to Professor Jung-Il Jin, vice president of the Macromolecular Division, in appreciation for the Samsung's gift. The presentation was made at the IUPAC General Assembly Reception in Ottawa, Canada, in August 2003.

IUPAC continues to make special efforts in education in developing countries. With the cooperation and support of UNESCO, IUPAC continues to distribute two important tools for teaching chemistry in areas with limited laboratory and audio-visual facilities. *DIDAC,* a set of transparencies for overhead projection that covers the essential elements of chemistry, was initially developed by Agfa Gevaert NV, a Company Associate in Belgium. These materials are not language dependent; only the teacher's workbook must be translated into the language of instruction. The workbooks have been translated into many languages, including Arabic, Japanese, Korean, and Russian, and distributed to over 47 countries. The transparencies have been extended to color posters for use in countries with minimal electricity, and the system will soon be available in free CD-ROM and book versions. *Small-scale chemistry apparatus* and instructions on its use in teaching chemistry were distributed by means of workshops in a large number of countries in 2002-2003, including Azerbaijan, Botswana, Cape Verde, China, Congo (Brazzaville), Eritrea, Guinea-Bissau, Hong Kong, Latvia, Liberia, Mauritius, Morocco, Namibia, Seychelles, Sierra Leone, Sudan, Swaziland, Ukraine, and Uzbekhistan. Translations of example worksheets into national languages also continues. Spanish and Uzbek translations have been completed. The latter has been taken by Afghan translators to prepare Pushtu and Dari language versions in anticipation of an intervention in Afghanistan.

IUPAC recognizes its specific responsibility to encourage and support young scientists throughout the world. Since 2000 the *IUPAC Prize for Young Chemists* has been awarded each year for the best Ph.D. theses in the chemical sciences in the previous year. Over four years, 18 awards have been

IUPAC 2002 and 2003 Prize Winners (clockwise from left): Stefan Lorkowski, Martin Trent Lemaire, Gonzalo Cosa, Roman Boulatov, Kaihsu Tai, Christoph Schaffrath, Jinsang Kim, Simi Pushpan, and Jeroen Cornelissen.

My World—A Chemical World, by Rikako Yoshida (age 10), Japan.



The Power of Chemistry, by Byung-Chan Kang (age 16), Korea.

Winning entries in the "It's A Chemical World" Poster Competition, organized by Science Across the World and IUPAC Subcommittee on the Public Understanding of Chemistry.

made in this highly competitive program, each award providing USD 1000 and travel expenses to present a poster and receive the award at an IUPAC Congress. In Ottawa in 2003, nine young scientists received awards for innovative research in areas as diverse as supramolecular assemblies, differential gene expression, synthesis of metalloporphyrins, degradation of pharmaceutical products, and simulations of processes in the synapse. This is one of the only international programs designed to provide such public recognition to chemists at the early stages of their careers.

IUPAC traditionally provides travel support to assist young scientists, especially from developing countries, to participate in its biennial Congress. In 2003, IUPAC and the Canadian Society for Chemistry, with substantial additional support from the US Army Research Office and UNESCO, supported travel for 85 young chemical scientists from 45 countries. Each scientist presented a poster or talk and participated in the full range of Congress sessions.

A well-attended symposium on the Public Understanding of Chemistry at the IUPAC Congress focused on:

- *The Flow of Ideas Between Chemists and the Public Through the Media*
- *The Flow of Ideas From the Research Laboratory to Industrial or Public Use*
- *The Flow of Ideas Through Society*

Eminent speakers from academia, industry, and the media explored how the media influence public opinions of chemistry, and how they can be used to enhance the flow of information between chemists and the public, and vice versa. Participants also discussed the movement of ideas between the research laboratory and industry, and how the convergence of these ideas can be optimized to meet the needs of both groups. Finally, other methods of communication between the chemical community and society-at-large were explored.

Also at the Congress, awards were made for the ten top posters in the *It's a Chemical World* competition among students ages 10-16. This event, organized by IUPAC Committee on Chemistry Education together with Science Across the World, had asked students to visualize their ideas of living in a chemical world. The competition was widely advertised and drew 402 entries from young people in 24 countries.

IUPAC will broaden its national membership base and will seek the maximum feasible diversity in membership of IUPAC bodies in terms of geography, gender, and age.

Although IUPAC's membership of 45 National Adhering Organizations (NAOs) represents countries that generate about 85 percent of the world's chemical output, there are several countries with substantial chemistry enterprises that are not yet members of the Union. As the chemical sciences develop worldwide, efforts continue to encourage additional countries to become part of the global IUPAC network. In 2003, Bangladesh became a full member of the Union. Currently 21 countries are Associate NAOs, including a number of emerging nations such as Mauritius, which became an Associate NAO in 2003.

A group of Young Observers at the IUPAC General Assembly, held in Ottawa, Canada, in August 2003.

Members of IUPAC's governing bodies and committees are selected primarily on the basis of expertise, but special efforts are made to assure geographic diversity and to encourage the selection of younger scientists and female scientists wherever feasible. A step forward was taken in 2003 with the establishment of the Union Advisory Committee, which consists of one senior scientist nominated by each NAO. The UAC will provide advice on policy matters to the IUPAC Executive Committee, thus ensuring input from *all* NAOs. Moreover, the UAC will provide high-level contacts in each country who can propose members of IUPAC committees and project task groups.

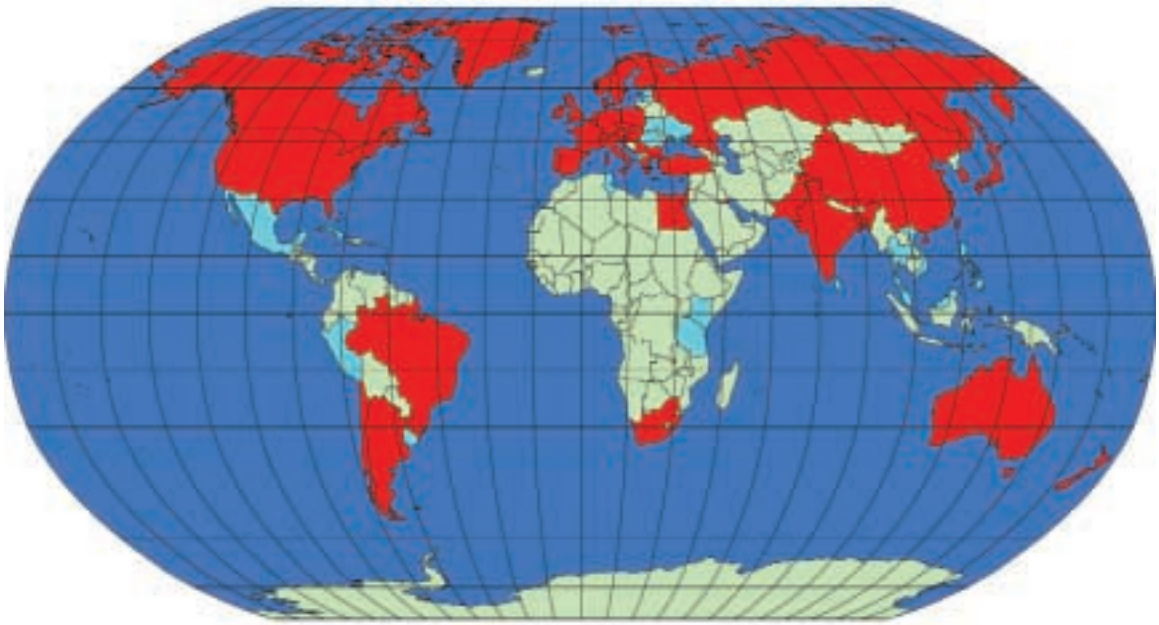
A program to interest mid-career younger chemists in IUPAC work was expanded in 2003. Four NAOs supported the travel of over 15 "Young Observers" to the General Assembly in Ottawa. The largest groups were from the US and the UK; IUPAC provided additional support to bring one scientist each from seven other countries. Each of the "observers" actively participated in committee meetings and added vitality and additional perspective to the committees' work. Several of these younger chemists have already become directly involved in IUPAC projects.

IUPAC reaches out to individual chemists and to other organizations to enhance its global impact. Over 30 other international scientific organizations have applied for and been granted the status of IUPAC *Associated Organizations*. These organizations range from regional chemistry federations to societies dedicated to a specific sub-discipline of chemistry.

At the individual chemist level, IUPAC has direct contact with about 4500 interested scientists in 45 countries through its *Affiliate Membership Program.* Formed in 1983, this program permits individual chemists—directly or through their national chemical societies—to stay abreast of IUPAC's work and activities. Each Affiliate receives the bimonthly news magazine *Chemistry International,* along with other communications from the IUPAC Secretariat.

The IUPAC Fellows Program, established in 1997, is open to all those who have completed service on IUPAC bodies. Currently there are more than 1000 IUPAC Fellows. Fellows receive *Chemistry International* and are invited to participate in two-way communication with IUPAC bodies on important issues to which IUPAC might make a significant contribution.

Since proposals for projects are sought globally, members of task groups need not necessarily come from countries currently affiliated with IUPAC. This policy significantly broadens the global reach of IUPAC. Likewise, information on the Union that is disseminated at IUPAC-sponsored conferences serves to acquaint a wider circle of chemists with IUPAC's work and encourage participation.



IUPAC Member Countries: *National Adhering Organizations (in red) and Associate NAOs (in blue).*

Mission

IUPAC is a non-governmental organization of member countries that encompass more than 85% of the world's chemical sciences and industries. IUPAC addresses international issues in the chemical sciences utilizing expert volunteers from its member countries. IUPAC provides leadership, facilitation, and encouragement of chemistry and promotes the norms, values, standards, and ethics of science and the free exchange of scientific information. Scientists have unimpeded access to IUPAC activities and reports. In fulfilling this mission, IUPAC effectively contributes to the worldwide understanding and application of the chemical sciences, to the betterment of the human condition.

National Adhering Organizations

Asociación Química Argentina *(Argentina)*
Australian Academy of Science *(Australia)*
Österreichische Akademie der Wissenschaften *(Austria)*
Bangladesh Chemical Society *(Bangladesh)*
The Royal Academies for the Sciences and Arts of Belgium *(Belgium)*
Brazilian Chemistry Committee for IUPAC *(Brazil)*
Bulgarian Academy of Sciences *(Bulgaria)*
National Research Council of Canada *(Canada)*
Sociedad Chilena de Química *(Chile)*
Chinese Chemical Society *(China)*
Chemical Society located in Taipei *(China)*
Croatian Chemical Society *(Croatia)*
Czech National Committee for Chemistry *(Czech Republic)*
Den Kongelige Danske Videnskabernes Selskab *(Denmark)*
National Committee for IUPAC *(Egypt)*
Suomen Kemian Seura-Kemiska Sällskapet *(Finland)*
Comité National Français de la Chimie *(France)*
Deutscher Zentralausschuss für Chemie *(Germany)*
Association of Greek Chemists *(Greece)*
Hungarian Academy of Sciences *(Hungary)*
Indian National Science Academy *(India)*
Royal Irish Academy *(Ireland)*
Israel Academy of Sciences and Humanities *(Israel)*
Consiglio Nazionale delle Ricerche *(Italy)*
Science Council of Japan *(Japan)*
Korean Chemical Society *(Korea)*
Kuwait Chemical Society *(Kuwait)*
Koninklijke Nederlandse Chemische Vereniging *(Netherlands)*
Royal Society of New Zealand *(New Zealand)*
Norsk Kjemisk Selskap *(Norway)*
Chemical Society of Pakistan *(Pakistan)*
Polska Akademia Nauk *(Poland)*
Sociedade Portuguesa de Química *(Portugal)*
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IUPAC Secretariat

P.O. Box 13757 Research Triangle Park, NC 27709-3757 USA
Tel: +1 (919) 485 8700 Fax: +1 (919) 485 8706 E-mail: secretariat@iupac.org www.iupac.org