

I U P A C

Advancing Worldwide Chemistry
Biennial Report 2006–2007





Goal 1

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



Goal 2

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



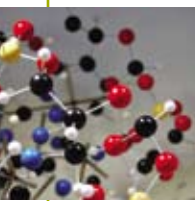
Goal 3

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



Goal 4

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



Goal 5

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.



Goal 6

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.



The International Union of Pure and Applied Chemistry (IUPAC) is a non-governmental organization of member countries that encompasses more than 85% of the world's chemical sciences and industries. IUPAC was formed in 1919 by chemists from industry and academia. For almost nine decades, the Union has succeeded in fostering worldwide communication 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 has been proactive in establishing a wide range of conferences and projects designed to promote and stimulate modern developments in chemistry, and to assist in aspects of chemical education and the public understanding of chemistry. IUPAC facilitates and encourages international agreements and the coordination of numerous activities carried out by national and regional chemistry organizations. It also contributes to the work of the International Council for Science (ICSU) in promoting science and its values, including freedom in the conduct of science, ethics of science, equitable access to scientific data and information, and facilitation of science education and capacity building, in all regions of the world.

This report lists IUPAC's six long-range goals and provides illustrations of actions taken during the last two years toward meeting those goals. The Union's work is done almost entirely by approximately 1400 volunteer scientists from many countries who serve on IUPAC's committees, subcommittees, and task groups. IUPAC's scientific work is conducted largely under a formal 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 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. Significant support is also received from the chemical industry, either through the Company Associates program or in the form of grants for prizes and special projects. Nearly half of the budget of approximately USD 1.5 million in 2007 went to the operating expenses of IUPAC's Divisions and Committees and commitments for peer-reviewed projects, primarily travel costs for volunteers who comprise committees and project task groups. 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.



Important global issues are addressed by the Committee on Chemical Research Applied to World Needs (CHEMRAWN). The CHEMRAWN series of conferences has allowed IUPAC to address issues that transcend pure science and have important socio-political aspects. Over the past quarter of a century, fifteen 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, discussed, and debated how chemistry, chemical research, and chemical resources can help meet major human needs or solve major problems.

Each CHEMRAWN conference focuses on an issue of global significance. Examples include food security, mitigation of greenhouse gases, sources of cleaner energy, chemistry as a tool for sustainable development, pollution prevention through the redesign of chemical processes, and adequacy of supply of pure water and sanitation.

The Perspectives and Recommendations volume for the CHEMRAWN XV conference, *Chemistry for Water*, was published in 2006 and is available on request. It is also available online at no charge.

Chemical sciences and technologies are needed to resolve water-related problems and issues such as scarcity, purification, waste treatment, control, and analysis. This conference, held in Paris, France, in 2004, explored the latest scientific and engineering approaches to these problems and issues, in order to develop world-wide strategies and policy recommendations, focusing on the common interests of academic institutions, corporations, governmental agencies, and the general public.

The Role of Chemistry in Sustainable Agriculture and Human Wellbeing in Africa was the theme for the CHEMRAWN XII conference, which was hosted by Stellenbosch University in the Western Cape province of South Africa, from 2–5 December 2007. Improving the quality of life of the peoples of Africa through the provision of adequate food, with specific attention to the role of chemistry, was the prime focus of the conference. The objectives of the conference were

- to secure a better understanding of sustainable agriculture in Africa in a globalised market
- to develop a systems approach to optimizing food provision in Africa
- to utilise high technology, including global observation systems, biotechnology and Green Chemistry, in ensuring food security in Africa
- to spotlight chemistry as a core science in food security in Africa
- to utilize agricultural produce from Africa as a source of biofuels, value-added and nichechemicals
- to promote science-based capacity development at universities in Africa as a prerequisite for food security.



The CHEMRAWN XVII conference, Greenhouse Gas Mitigation Strategies, was held at Queen's University, Canada, in July 2007. Governments struggle with policies to mitigate greenhouse gases, trying to balance the long-term imperative with shorter term needs of the economy and of emerging nations. Industries seek ways to reduce their emissions but are constrained by the lack of practical technology and of clear government direction. The greenhouse gas problem has also become a major area of basic scientific research. This conference brought together participants from government, industry, and academia to seek a broad mutual understanding of the current situation and clarity for future directions.

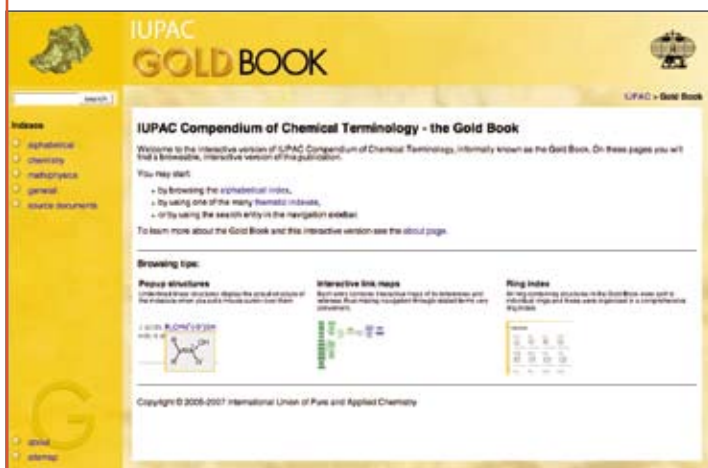
IUPAC and the Organisation for the Prohibition of Chemical Weapons (OPCW) jointly organized a workshop held in Zagreb, Croatia, in April 2007. It was held to assist with preparation for the Second Review Conference of the Chemical Weapons Convention (CWC), held in April 2008. The CWC has been in force since 1997, and to date 182 States have joined the Convention. The goal of the CWC is total prohibition of all chemical weapons and the destruction of all stockpiles and production facilities by 2007. Extensions have been agreed upon and, for some stockpiles, the deadline is now 2012. This disarmament is subject to strict international verification by the OPCW. The CWC also prohibits the development, production, acquisition, stockpiling, and retention of chemical weapons and requires national implementation measures, including legislation, together with the international verification of chemical industry facilities. Furthermore, the CWC aims to strengthen States Parties' capacities in the field of protection against chemical weapons, and encourages international cooperation in the peaceful application of chemistry. The CWC requires that reviews of the operation of the Convention are carried out at five-year intervals and specifies that such reviews "shall take into account any relevant scientific and technological developments," so as to ensure the continued effectiveness of the treaty



and of its verification and implementation systems. A report, *Pure and Applied Chemistry* **80** (1), 175–200 (2008), was prepared to assist the parties of the CWC with that review.

Another global issue addressed by IUPAC is the development of chemistry in a cooperative way in the Middle East. In collaboration with the American Chemical Society, the Royal Society of Chemistry, and the Gesellschaft Deutscher Chemiker, IUPAC sponsored the third conference on Research and Education in the Middle East (Malta III), held in Istanbul in December 2007, which built on earlier conferences held in Malta (Malta I and II). Middle Eastern participation in Malta III was the largest yet of the three conferences. Of the 90 participants, 67 were from Middle Eastern countries. The conference provided neutral ground for discussions on shared challenges in environment, materials science, medicinal chemistry, nanotechnology, energy, and education. An especially urgent need for action on degradation of water quality in Gaza was identified during the environmental workshop. Malta III attendees unanimously adopted a communiqué addressed to regional and world leaders to urge action on this issue. The document was delivered to Tony Blair, envoy to the Middle East working on behalf of the USA, Russia, the United Nations, and the European Union.

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The *Gold Book* (IUPAC *Compendium of Chemical Terminology*) was published online and on CD-ROM in an enhanced, interactive XML version (<http://goldbook.iupac.org>). The original printed version has been meticulously marked in XML, which enables the creation of many indexes. For instance, some indexes extract chemical meaning so that entries can be selected based on the compounds (index of structures, chemical formulas, ring index), while others summarize information about physical constants, units, and quantities. Other indexes list images and offer selections of acronyms and abbreviations. The link maps are another unique feature. They graphically display the relation of an entry to other terms and definitions, often revealing relationships that are difficult to decipher by other means.

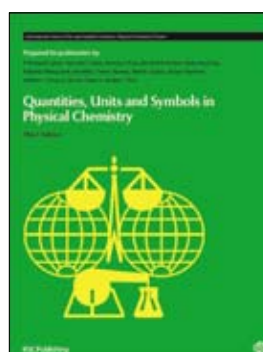
The application of the IUPAC International Chemical Identifier (InChI) is becoming more widespread. This is a character string unique to any chemical structure, generated algorithmically by a software program. Unlike other unique identifiers, such as the CAS registry number, it has the property that the structure can be regenerated from the InChI with a success rate greater than 99%. InChIs are now used by major

Internet databases (~25 million structures) and are starting to be used by journals. Software developers are providing the identifier in their output. A recent proposed extension is InChI Hash, developed primarily to facilitate use of the InChI by web search engines (see www.iupac.org/inchi/).

The Third Edition of the *Green Book* (*Quantities, Units and Symbols in Physical Chemistry*) was published in July 2007 and addresses many of the questions raised after the second edition. As with previous versions, this edition was written to enable clear understanding in an interdisciplinary environment and to convey information in a global multidisciplinary arena in which chemistry plays a central role. Examples are provided to explain how to avoid ambiguity in conveying information. The third edition has a significantly expanded index that provides a dictionary of terms and symbols and useful conversion tables.

The most recent edition of the *Red Book* has been translated into Spanish. This replaces the previous version, *Nomenclatura de Química Inorgánica. Recomendaciones de 1990*, by Luis F. Bertello and Carlos Pico Marin.

IUPAC is recognized as the final authority on the names of elements. The joint IUPAC-IUPAP working party on the discovery of new elements has been reactivated following a considerable number of publications concerning new elements with atomic numbers in the range 112 to 117. Currently, the working party is evaluating the literature to establish the authenticity of the claims for discovery of these new elements.





The Commission on Isotopic Abundances and Atomic Weights recommended significant changes to the standard atomic weights of five chemical elements: lutetium, molybdenum, nickel, ytterbium, and zinc. The changes are based on new determinations of isotopic abundances and reviews of previous isotopic abundances and atomic masses. In addition, the recommended value for the isotope amount ratio of $^{40}\text{Ar}/^{36}\text{Ar}$, which may be of importance to geochronologists, has been changed. These changes will be published in a new Table of Standard Atomic Weights 2007, which will be submitted for publication in *Pure and Applied Chemistry*.



IUPAC sponsored 65 conferences during the biennium, ranging from the flagship IUPAC Congress (the 41st held in Torino, Italy, in August 2007) and large international meetings on particular areas of chemistry to smaller symposia and workshops on specific topics. The Congress, co-sponsored and organized by the Italian Chemical Society, was centered around the theme of “Chemistry Protecting Health, Natural Environment and Cultural Heritage.” It attracted approximately 2000 attendees from around the world. IUPAC concurrently held its 44th General Assembly in Torino. Over the 10 days of the biennial General Assembly, 440 participants took part in an intense and intricate schedule of various committee and division meetings and events. Among the major events were four round table discussions and the World Chemistry Leadership Meeting (WCLM).

Integrated within the Congress schedule were a variety of workshops, a discussion panel on Ethics in Science and Education following the presentation of the Roald

Hoffmann play *Should've*, and a session on the Multiple Uses of Chemicals and Chemical Weapons. In addition, the Congress offered CHEM-BIO-TECH, the joint meeting of the IUPAC 1st Symposium on Chemical Biotechnology (ISCB-1) and the 8th Symposium on Bio organic Chemistry (ISBOC-8). The WCLM, which attracted 75 participants, focused on the health and environmental safety of chemical products, emerging issues of societal concern, and the resulting regulatory trends. The WCLM concentrated on the promising, yet challenging, global effort to meet the commitment that by 2020 chemicals are used and produced in ways that minimize significant adverse effects on human health and the environment. The 2020 commitment was made at the 2002 World Summit on Sustainable Development in Johannesburg and has led to new policy frameworks such as SAICM (UNEP/WHO) and regulations such as REACH (EU Commission).

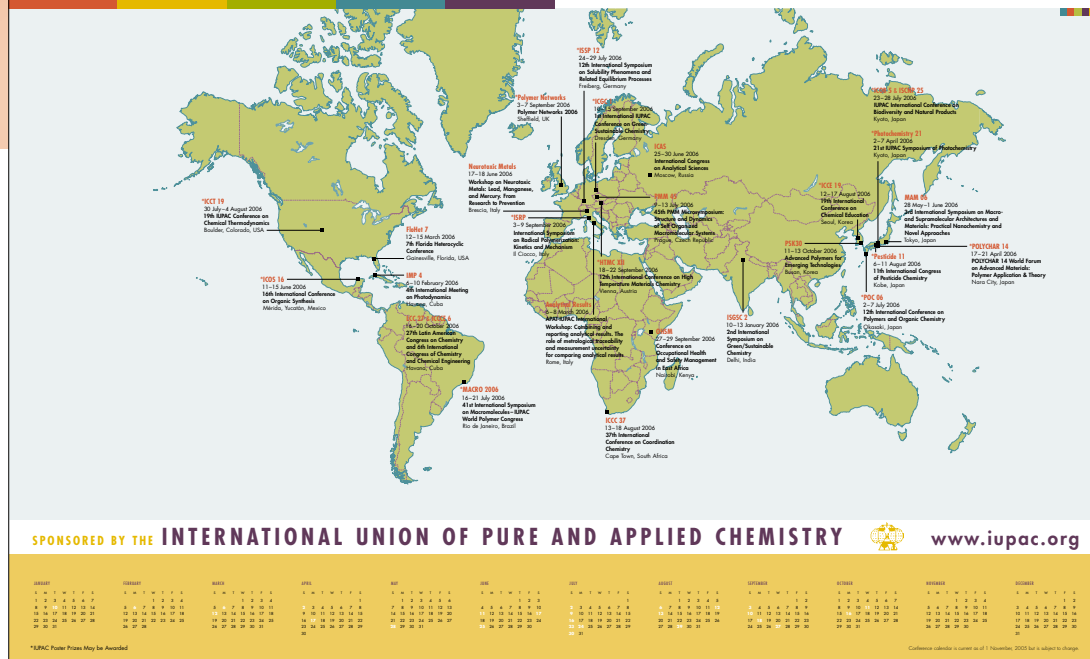
Four round table discussions were held for the first time during the General Assembly to allow small groups of Council delegates to debate subjects of mutual interest in a setting conducive to the free exchange of ideas. A consensus emerged among the 67 participants that IUPAC should assume a leading role in ensuring that 2011 is proclaimed the International Year of Chemistry by the United Nations.

Other well-established series of conferences held during the biennium included the following:

- Photochemistry, XXIst IUPAC Symposium on (Kyoto, Japan)
- Polymer Characterization, World Forum on Advanced Materials (Polymer Application and Theory) and 14th Annual Tutorial on (POLYCHAR 14) (Nara, Japan)
- Organic Synthesis, 16th International Conference on (ICOS 16) (Merida, Yucatan, Mexico)
- Polymers and Organic Chemistry 2006, 12th International Conference on (POC) (Okazaki, Japan)



IUPAC 2006 CONFERENCES



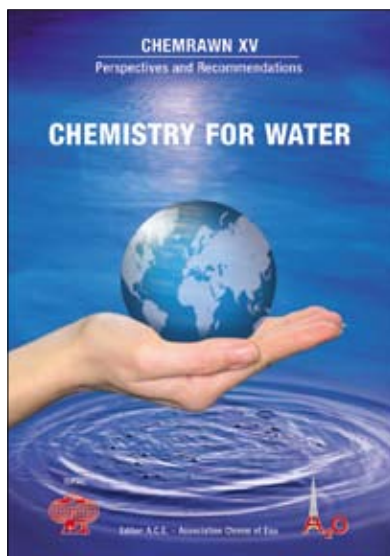
- World Polymer Congress - MACRO 2006, 41st International Symposium on Macromolecules (Rio de Janeiro, Brazil)
- Biodiversity and Natural Products, 25th IUPAC International Conference on (ICOB-5 & ISCNP) (Kyoto, Japan)
- Solubility Phenomena and Related Equilibrium Processes, 12th International Symposium on (ISSP 12) (Freiberg, Germany)
- Chemical Thermodynamics, 19th IUPAC Conference on (ICCT 19) (Boulder, Colorado, USA)
- Pesticide Chemistry, 11th IUPAC International Congress of (Kobe, Japan)
- Chemical Education, 19th International Conference on (ICCE) (Seoul, Korea)
- Coordination Chemistry, 36th International Conference on (ICCC 36) (Cape Town, South Africa)
- Physical Organic Chemistry, XVIII International Conference on (ICPOC-XVIII) (Warsaw, Poland)
- Chemical Sciences, 9th Eurasia Conference on (Antayla, Turkey)
- Green-Sustainable Chemistry, First International Conference on (Dresden, Germany)
- High Temperature Materials Chemistry, 12th International Conference on (HTMC-XII) (Vienna, Austria)
- Polymer Characterization, World Forum on Advanced Materials and 15th Annual Tutorial on (POLYCHAR 15) (Rio de Janeiro, Brazil)
- Mycotoxins and Phycotoxins, XIIth International Symposium on (ISMP) (Istanbul, Turkey)
- Heterocyclic Chemistry, 21st International Congress of (ICHC) (Sydney, Australia)
- Solution Chemistry, 30th International Conference on (ICSC 30) (Perth, Australia)
- Novel Aromatic Compounds, 12th International Symposium on (ISNA-12) (Awaji City, Japan)
- Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS-14), 14th IUPAC International Symposium on (Nara, Japan)
- Plasma Chemistry, 18th International Symposium (ISPC-18) Kyoto, Japan
- MacroMolecular Complexes (MMC-12), 12th IUPAC International Symposium on (Fukuoka, Japan)
- Ionic Polymerization, International Symposium on (Kloster Banz, Germany)
- Metallomics 2007, International Symposium on (Nagoya, Japan)

IUPAC continues to be a leader not only in nomenclature, but also in the compilation and critical evaluation of chemical data. Seven books have been published during this biennium:

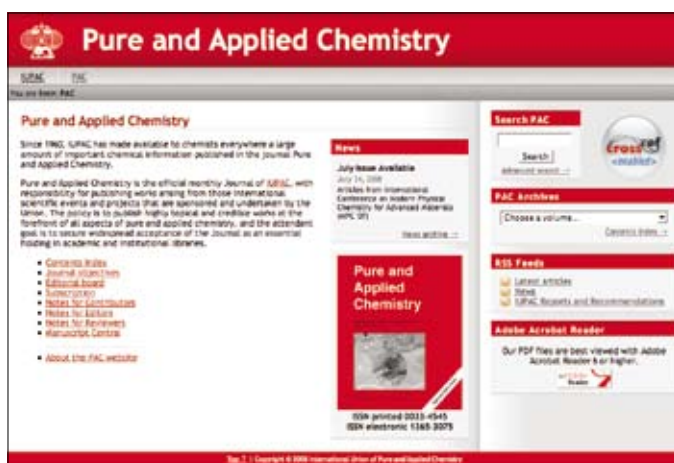
- *Combining and Reporting Analytical Results*
- *Fundamental Toxicology, Chemistry for Water - CHEMRAWN XV - Perspectives and Recommendations*
- *Developments and Applications in Solubility*
- *Thermodynamics, Solubility and Environmental Issues*
- *Environmental Colloids and Particles: Behaviour, Separation and Characterisation*
- *Quantities, Units and Symbols in Physical Chemistry - the IUPAC Green Book - 3rd edition*
- *Biophysico-Chemical Processes of Heavy Metals and Metalloids in Soil Environments.*

Three further volumes in the *Solubility Data Series* were published in 2006 and 2007:

- *Hydrocarbons with Water and Seawater – Revised and Updated (12 part series)*
- *Alcohols with Water – Revised and Updated (5 part series) and*
- *Acetonitrile: Ternary and Quaternary Systems*



During the last two years, IUPAC projects have led to 22 recommendations and technical reports published in *Pure and Applied Chemistry*. Abstracts and full-text versions of these recommendations and technical reports are available through PAC online at no cost.



Pure and Applied Chemistry is now available online beginning with vol. 1 (1960); the format of the most recent online volumes (from 2007) features major enhancements in usability, including “out-bound linking” of the references to their sources, via the CrossRef service.

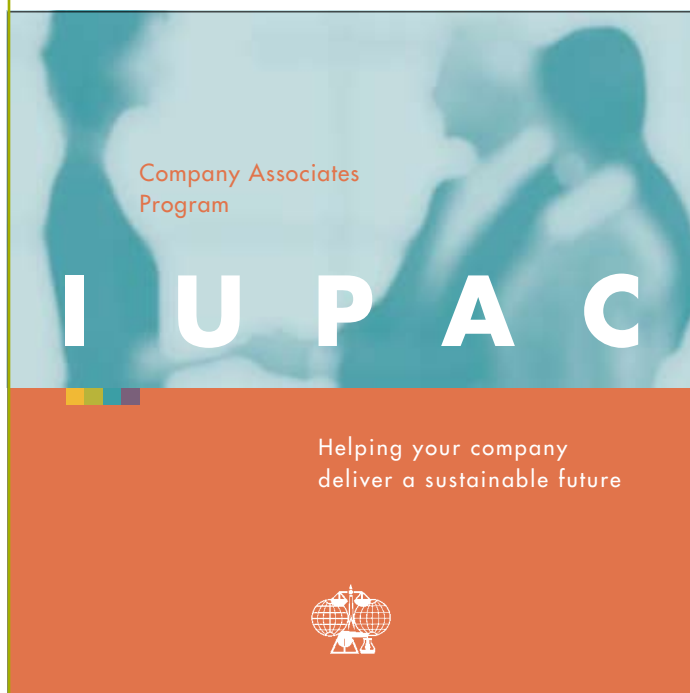
IUPAC will assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life.

From IUPAC's inception, the inclusion of the word "Applied" in its title signaled a strong tie to the chemical industry. IUPAC has long had a formal program of Company Associates and a Committee on Chemistry and Industry (COCI), which concentrates its efforts on programs and issues pertinent to industrial interests and concerns. Many of the benefits accruing to industry from IUPAC activities are indirect. For example, the conferences described above explore new developments in several areas of chemical science and are well-attended by industrial, as well as academic, chemists. Likewise, the global issues discussed previously are of critical importance to industry. Thus, IUPAC's efforts to provide a sound and unbiased evaluation of current science can have an impact on industrial processes and products in many countries.

During this biennium, there has been considerable emphasis on strengthening industry links through the expansion of the Company Associates program. COCI has developed a strategy to explain more cogently the significant benefits for Company Associates, as well as for the National Adhering Organizations in their respective countries. A new brochure has been distributed to publicize the program more vigorously. The COCI/IUPAC global perspective enables companies to share best international practices, which is of particular benefit to emerging industries. It is also critical for the worldwide standardization of industrial procedures and attitudes.

COCI has continued its highly successful safety training program and workshops. The IUPAC-UNESCO-UNIDO Safety Training Program allows experts from developing countries to learn about safety and environmental protective measures by visiting and working in plants of IUPAC Company Associates in the developed world. Each scientist or engineer accepted into the program typically spends one to three weeks in training. Chemists from Egypt, Ghana, and Uruguay received training in facilities in the UK and Japan. The Safety Training Program was the focus of a workshop at the 2007 IUPAC General Assembly and Congress in Torino. Six fellows and two international experts in environmental toxicology participated through oral presentations, posters, and a panel discussion. COCI has also worked with the Committee on Chemistry Education (CCE) to add an industry perspective to the overarching IUPAC initiatives to foster public understanding and appreciation of chemistry.


COCI also provides a forum for dialog with trade associations and national bodies. IUPAC has initiated a pilot program to offer a one-year complimentary Company Associate membership to those companies that sponsor IUPAC conferences. Such a sponsorship commitment makes a significant contribution to IUPAC work. Follow-up contact is an acknowledgment of that support and provides an opening for long-term collaboration.



Company Associates Program

I U P A C

Helping your company deliver a sustainable future





The IUPAC-Richter Prize in Medicinal Chemistry was established by a generous gift from the Chemical Works of Gedeon Richter, Plc. (Budapest, Hungary) to acknowledge the key role that medicinal chemistry plays in improving human health. By establishing this prize jointly with IUPAC, Richter contributes to the international recognition of the role of research in medicinal chemistry, publicizes the company's commitment to medicinal chemistry research, and further promotes IUPAC activities. The prize of USD 10 000 is awarded to an internationally recognized scientist, preferably a medicinal chemist, whose activities or published accounts have made an outstanding contribution to the practice of medicinal chemistry or have led to an outstanding example of new drug discovery. The prize is awarded biennially by a selection committee appointed by the Subcommittee on Medicinal Chemistry and Drug Development of the IUPAC Chemistry and Human Health Division. The Prize in Medicinal Chemistry was awarded for the first time in August 2006 and was presented at the XIXth International Symposium of Medicinal Chemistry in Istanbul, Turkey. The recipient was Professor Malcolm Stevens, of Nottingham University, UK, in recognition of his leadership and contributions to the discovery of anticancer drugs. His work has resulted in the discovery of six novel small molecule agents that have progressed into clinical trials. Two of these are now registered drugs.



In April 2006, COCI members visited the laboratories of Syngenta, in the Research Triangle Park, NC, USA. The tour included a walk by the green houses. Opened in 1984, the Syngenta Biotechnology site in RTP includes a staff of 250, 45000 sq. ft. of lab space, and 50000 sq. ft. of greenhouse space.

Under an agreement made in 2007, the IUPAC Polymer Division and DSM Innovation Center B.V. will organize a symposium on performance materials to be held during each biennial IUPAC World Polymer Congress. A Performance Materials Award in the amount of EUR 50 000 also will be presented during one of the plenary sessions of the Congress program. The executive editors of *Polymer International* and the IUPAC Polymer Division established an award for creativity in applied polymer science or polymer technology. This new award celebrates the achievements of young researchers in the polymer community. The first award was presented in June at the IUPAC World Polymer Congress - MACRO 2008, in Taipei. The winner was awarded USD 5000 plus travel and hotel accommodation expenses to attend MACRO 2008 and present a plenary lecture.



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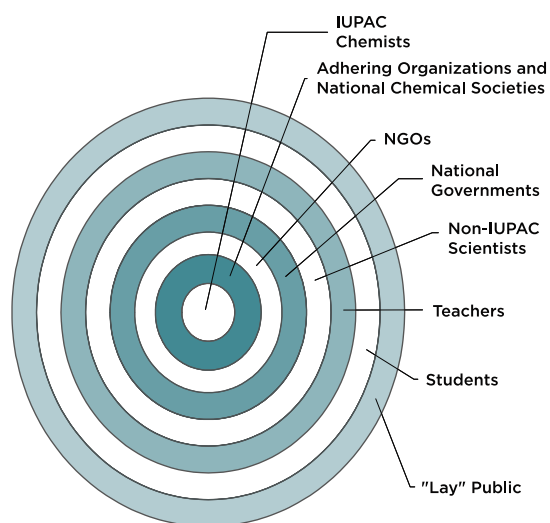
IUPAC's constituency consists of the entire world of chemistry, both organizational and individual. Official contacts are maintained with the National Adhering Organizations, but there is also need for contact with national chemical societies, industrial companies, and individual chemists. Maintaining contact with such a broad constituency requires both web-based and conventional forms of communication.

The IUPAC web site serves as a major vehicle for worldwide communication. News from and about IUPAC, full listings of current and completed projects, detailed committee membership information, publications, and conference calendars are updated regularly. In addition, links to national chemical web sites, Company Associates, and Associated Organizations provide a facile means for chemists to remain aware of a wide range of international activities. The bimonthly IUPAC news magazine *Chemistry International* is an attractive, vibrant, informative, and popular publication. It is distributed in print form to chemists in nearly 100 countries and is also available online. It serves as a major means of publicity and communication, and current issues are distributed at IUPAC conferences.

IUPAC has formal and informal ties to international organizations that impinge on every aspect of individual and commercial society, such as 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 Organization, 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. IUPAC has moved to strengthen its ties with the International Council for Science (ICSU) and to play a greater role in its activities, because it is important that the promotion of chemistry goes hand-in-hand with the wider promotion of science.

In March 2006 a conference, Towards Modernizing Chemical Science Education in Sri Lanka Universities, was held in Colombo under the sponsorship of IUPAC's Flying Chemists Program and its Scientifically Emerging Regions program. The conference, which attracted nearly 80 percent of Sri Lankan academics in the chemical sciences, is the first step toward replacing the current knowledge-based education system with modern teaching methods. IUPAC provided four experts in chemistry education. The conference provided timely assistance to the country's effort to upgrade undergraduate chemistry education. Currently, the quality of university graduates does not match the needs of the labor market in Sri Lanka. The conference was of historical significance, for no such gathering of academics in the chemical sciences had ever been held.

Estimates indicate that Asia produces some 30% of the chemistry research done worldwide. Although this



*Chemists and the Public:
IUPAC's Role in Achieving Mutual
Understanding, Pure and Applied
Chemistry 80(1), 161-174 (2008).*



Princess Chulabhorn Mahidol delivered the Nagoya Medal Special Awards Lecture on "Recent Investigations of Cytotoxic Natural Products from Thai Plants" at the first International Conference on Cutting-Edge Organic Chemistry in Asia (ICCEOCA-1) held in Naha, Okinawa, Japan, on 16-20 October 2006.

is a positive development, this research is currently concentrated in only a few countries. Earlier cooperative networks, such as the Network for the Chemistry of Biologically Important Natural Products and the UNESCO Network for Natural Products, have either ceased operating entirely or languish through a lack of funding. There is now an opportunity—indeed, a responsibility—for IUPAC to take the initiative to establish a new Asia network. Such a network would also complement a major initiative of the Japan Society for the Promotion of Science (JSPS) to catalyze cooperative research in Asia.

The collaborative new IUPAC East Asian Network for organic chemists has broad objectives, and it is now closely linked to the JSPS Asian Core Program, Cutting-Edge Organic Chemistry in Asia, which began in October 2005 in order to build and foster a sustainable program of high-quality organic chemistry research, education, and chemistry-based applications. The first meeting facilitated by the IUPAC East Asian Network was held in October 2006, as a satellite of the Asian CORE Program's first International Conference on Cutting-Edge Organic Chemistry in Asia. The meeting was entitled Strategic Planning for a New East Asian Network for Organic Chemistry, and Princess

Chulabhorn Mahidol delivered the Nagoya Medal Special Award Lecture on "Recent Investigations of Cytotoxic Natural Products from Thai Plants." In an effort to encourage conferences in scientifically emerging countries, IUPAC continues to provide modest financial support. These funds are typically used to subsidize attendance by young scientists or to include eminent scientists, designated as IUPAC lecturers, in the conference program. A report titled "Chemists and the Public: IUPAC's Role in Achieving Mutual Understanding" has been published in *Pure and Applied Chemistry* for wider dissemination.

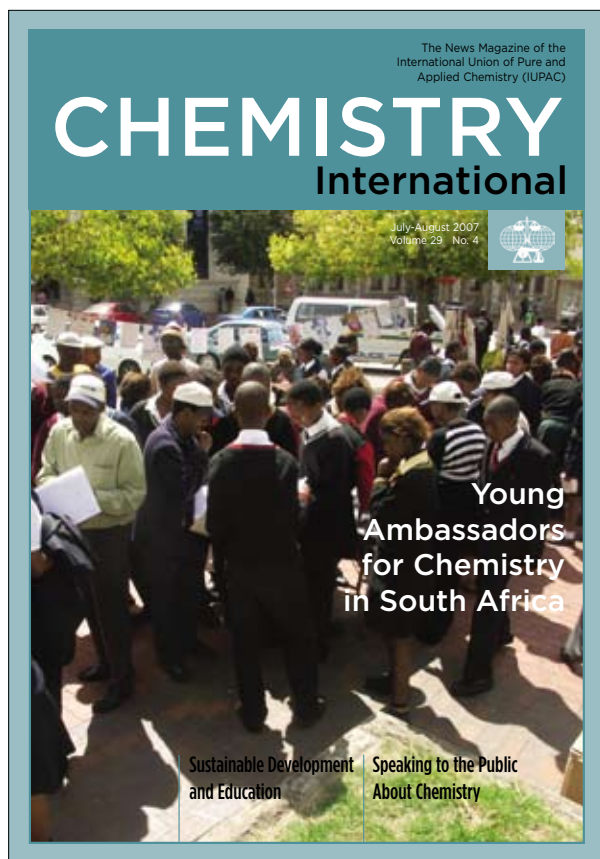
In July 2006, Bryan Henry became the first IUPAC president to participate in the International Chemistry Olympiad (ICHO) held in Gyeongsan, South Korea. President Henry presented copies of the IUPAC *Gold Book* to the gold medalists at the closing ceremony and delivered a brief talk and general overview of IUPAC at a farewell dinner that evening. In 2007 IUPAC signed a Memorandum of Understanding with the Steering Committee of the International Chemistry Olympiad (ICHO), to formalize IUPAC's support for ICHO. IUPAC will provide USD 10 000 to the ICHO to help economically disadvantaged countries participate in the Olympiad.

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.

IUPAC recognizes a particular responsibility to encourage and support young scientists throughout the world. Since the year 2000, the IUPAC Prize for Young Chemists has been awarded annually for the best Ph.D. theses in the chemical sciences. The IUPAC Prize for Young Chemists is the only international program designed to provide public and financially remunerative recognition to chemists at such early stages of their careers. Over eight years, 36 awards have been made in a highly competitive program; each award provides USD 1000 and travel expenses to present a poster and receive the award at an IUPAC Congress. In Torino in 2007, 10 young scientists (five each from 2006 and 2007) received awards for innovative research in wide-ranging areas. An additional four applicants, two each in 2006 and 2007, were awarded Honorable Mentions, in recognition of the extremely high quality of the competition.

In 2003 IUPAC received, from the Samsung General Chemicals Company (now the Samsung Total Petrochemical Co Ltd) of South Korea, an endowment of USD 125 000, to stimulate polymer education and research around the world. An additional USD 25 000 was added in 2006. The Polymer Division uses the income from this endowment for the following: (i) a Samsung-IUPAC Young Polymer Scientist award of USD 2000 is made every second year to a scientist under the age of 40, to enable participation in the forthcoming IUPAC World Polymer Congress; (ii) travel grants are made available for support of students from economically disadvantaged countries to attend the World Polymer Congress; (iii) an amount of USD 2000 is made available to organizers of World Polymer Congresses to defray some plenary lecturer costs; and (iv) support is provided for education-related projects.

The last of the Young Ambassadors for Chemistry (YAC) events was held in March 2007 in Grahamstown, South Africa, completing a five-year, five-nation, three-continent project intended to train teachers to



A week-long Young Ambassadors for Chemistry (YAC) event culminated in the central square of Grahamstown, South Africa, where the participants interacted with the public and shared what they had learned about chemistry. Nearly 80 students in their school uniforms spent the afternoon in the square showing the public that chemistry is an integral part of life and that it can also make it better.

help students communicate the benefits of chemistry. This last leg of the YAC series was carried out during the SASOL Science Festival, the largest science festival in Southern Africa. The SASOL SciFest, which attracted around 45 000 people over the week, proved to be the ideal environment for a YAC event. The Science Festival is an annual event, largely sponsored by the South African company SASOL, with support of many other firms. YAC is a partnership between the Public Understanding of Chemistry subcommittee of IUPAC's Committee on Chemistry Education and the Science Across the World Network, created to facilitate the flow of ideas between chemistry and society using young people as mediators. This fifth YAC event built upon the successes of those held earlier in Taipei, Buenos Aires, Krasnoyarsk, and Gwangju. The group included 24 teachers from 10 local schools. The goals of the workshops were to show educators productive ways to teach chemistry and how to build models, prepare chemistry-related advertisements and commercials, set up partnerships in schools, talk about genetics, communicate about chemistry and chemical products, and plan activities for learners.

IUPAC provides travel support to assist young scientists, especially from developing countries, to participate in its biennial Congress. In 2007, IUPAC joined with the organizers of the Torino Congress to support travel for 54 young chemical scientists from around the world. Each scientist presented a poster or lecture and participated in the full range of Congress sessions.

The advent of the IUPAC Poster Prizes program in 2004 provides National Adhering Organizations and eligible IUPAC-sponsored conferences with a strategic tool to encourage participation of young chemists in conferences. The Poster Prizes recognize outstanding poster presentations at IUPAC Congresses, IUPAC Division/Standing Committee-sponsored conferences, and designated national meetings. Each National Adhering Organization may select one conference

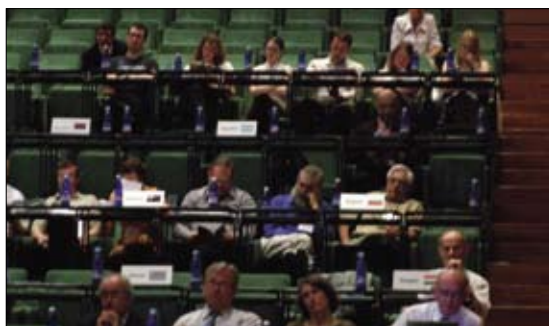


Since 2006, "Stamps International" has been a regular feature in the IUPAC news magazine *Chemistry International*. In each issue, a visually appealing chemistry-related postage stamp from a different country is presented, underscoring the international character of both philately and our science. A number of stamps celebrate scientific discoveries or honor well-known scientists, and they can be used as simple, yet powerful, teaching tools. The first column discussed the stamp shown here, which was issued by the USSR on 15 June 1965 to publicize the 20th IUPAC Congress, held in Moscow the following month.

per year at which to award IUPAC Poster Prizes. In 2006-7 86 Poster Prizes were awarded at 23 national chemistry meetings, while 48 Poster Prizes were awarded at 17 IUPAC-sponsored conferences. The prize selections are made by the conference organizers, and each winner receives a certificate signed by the IUPAC president, a copy of the IUPAC *Gold Book (Compendium of Chemical Terminology)*, and a two-year subscription to *Chemistry International*.

IUPAC also continues to benefit from the generosity of Georg Thieme Verlag, through the award of the Thieme-IUPAC Prize for a synthetic organic chemist under the age of 40. The award is made as a special feature of the biennial International Conference on Organic Synthesis; the most recent conference was held in Merida in 2006, and the award was presented to David MacMillan (California Institute of Technology, now at Princeton University).

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.



Every two years, the IUPAC Council—consisting of delegations from every National Adhering Organization—meets for a day and a half. The Council is briefed on progress made over the previous two years, receives various reports, and holds elections.

At the organizational level, IUPAC communicates with its National Adhering Organizations and continually strives to bring additional countries into the fold. The number of National Adhering Organizations was increased by three, to 51, when the Torino Council meeting approved National Adhering Organization status for the Sociedad Cubana de Química, Chemical Society of Ethiopia, and PEDECIBA Química (Uruguay). The Federación Latinoamericana de Asociaciones Química was added as an Associated Organization in 2006. The members of IUPAC bodies in 2006-7 represented 77 countries. Although member countries generate about 85% of the world's chemical output, there are several countries with a substantial chemistry enterprise that are not yet members of the Union. The current Associate National Adhering Organizations are being vigorously encouraged to move to National Adhering Organization status in the immediate future.

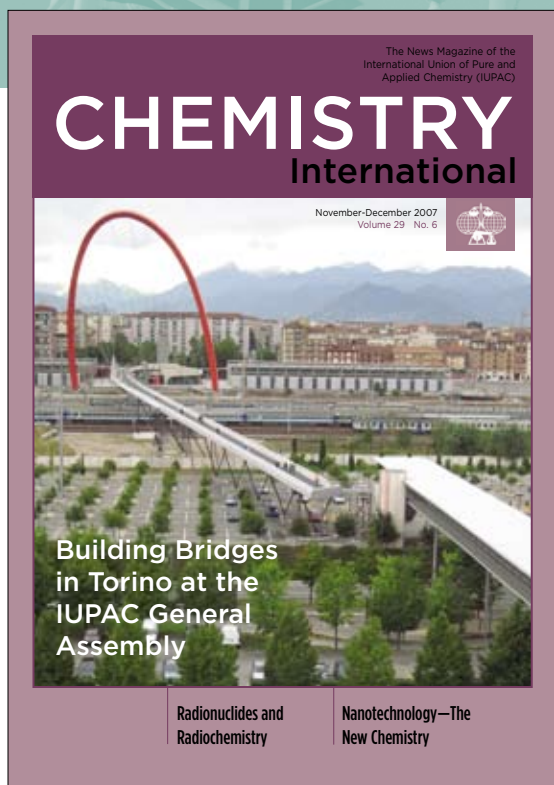
committee structure is to seek maximum inclusion and communication, rather than narrow national representation. In this way, even smaller chemical countries can become fully involved in the work of IUPAC.

Various programs have been put in place by National Adhering Organizations to interest mid-career younger chemists in IUPAC work, and to arrange for their participation as observers in committee meetings during the General Assembly. IUPAC, together with the Canadian, USA, and UK National Adhering Organizations, selected 17 chemists with varied backgrounds and interests from seven countries: Canada, Poland, Romania, Mauritius, Russia, UK, and the

Members of IUPAC's governing bodies and various committees are selected primarily on the basis of needed expertise, but special efforts are made to assure better diversity in terms of geography, gender, and age. At the Division level, elections are held for Titular Members, and once this group is established, Associate Members are added to cover further areas of expertise. Finally, the National Representatives are chosen deliberately to add members from countries not otherwise included. The purpose of the election process and the



Among the officers elected by the Council in Torino, Italy, in August 2007 are Jung-Il Jin (left) who became president on 1 January 2008, Nicole Moreau, who became vice president, and Anders Kallner, who continued as an elected member of the Bureau.



The IUPAC Congress and General Assembly took place in Torino, Italy, in August 2007. This cover of the November-December 2007 issue of *Chemistry International*, which covered the event, featured a view of the symbolic Olympic Arch built for the 2006 XX Olympic Winter Games. This compelling structure also captures the meaning of the Union's Congress and General Assembly.

The IUPAC Fellows Program, established in 1997, offers Fellow status to individuals who have completed service on IUPAC bodies. Currently there are more than 1400 IUPAC Fellows. These scientists 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.

USA. The participation of these Young Observers added vitality and a valuable perspective to the committee work in which they participated.

IUPAC reaches out to individual chemists and other organizations to enhance its global impact. More than 30 international scientific organizations are currently 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 more than 70 countries through its Affiliate Member Program. Formed in 1983, this program permits individual chemists—directly or through their national chemical societies—to express interest in IUPAC's work and to remain informed of IUPAC activities. Each Affiliate Member receives the bimonthly news magazine *Chemistry International* along with other communications from the IUPAC Secretariat.

Because proposals for projects are sought globally, members of task groups that carry out projects may come from anywhere, even countries not currently associated with IUPAC, thus broadening the global reach. 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 to encourage their participation.

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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

Australian Academy of Science (<i>Australia</i>)	Consiglio Nazionale delle Ricerche (<i>Italy</i>)
Österreichische Akademie der Wissenschaften (<i>Austria</i>)	Caribbean Academy of Sciences—Jamaica Chapter (<i>Jamaica</i>)
Bangladesh Chemical Society (<i>Bangladesh</i>)	Science Council of Japan (<i>Japan</i>)
National Academy of Sciences of Belarus (<i>Belarus</i>)	Jordanian Chemical Society (<i>Jordan</i>)
The Royal Academies for the Sciences and Arts of Belgium (<i>Belgium</i>)	Korean Federation of Science and Technology Societies (<i>Korea</i>)
Brazilian Chemistry Committee for IUPAC (<i>Brazil</i>)	Kuwait Chemical Society (<i>Kuwait</i>)
Bulgarian Academy of Sciences (<i>Bulgaria</i>)	Koninklijke Nederlandse Chemische Vereniging (<i>Netherlands</i>)
National Research Council of Canada (<i>Canada</i>)	Royal Society of New Zealand (<i>New Zealand</i>)
Sociedad Chilena de Química (<i>Chile</i>)	Norsk Kjemisk Selskap (<i>Norway</i>)
Chinese Chemical Society (<i>China</i>)	Chemical Society of Pakistan (<i>Pakistan</i>)
Chemical Society located in Taipei (<i>China</i>)	Polska Akademia Nauk (<i>Poland</i>)
Croatian Chemical Society (<i>Croatia</i>)	Sociedade Portuguesa de Química (<i>Portugal</i>)
Sociedad Cubana de Química (<i>Cuba</i>)	Colegio de Químicos de Puerto Rico (<i>Puerto Rico</i>)
Czech National Committee for Chemistry (<i>Czech Republic</i>)	Russian Academy of Sciences (<i>Russia</i>)
Det Kongelige Danske Videnskaberne Selskab (<i>Denmark</i>)	Serbian Chemical Society (<i>Serbia</i>)
National Committee for IUPAC (<i>Egypt</i>)	Slovak Chemical Society (<i>Slovakia</i>)
Chemical Society of Ethiopia (<i>Ethiopia</i>)	Slovenian Chemical Society (<i>Slovenia</i>)
Suomen Kemian Seura—Kemiska Sällskapet i Finland (<i>Finland</i>)	National Research Foundation (<i>South Africa</i>)
Comité National Français de la Chimie (<i>France</i>)	Ministerio de Ciencia y Tecnología (<i>Spain</i>)
Deutscher Zentralausschuss für Chemie (<i>Germany</i>)	Svenska Nationalkommittén för Kemi (<i>Sweden</i>)
Association of Greek Chemists (<i>Greece</i>)	Swiss Chemical Society (<i>Switzerland</i>)
Hungarian Academy of Sciences (<i>Hungary</i>)	Türkiye Kimya Dernegi (<i>Turkey</i>)
Indian National Science Academy (<i>India</i>)	National Academy of Sciences of Ukraine (<i>Ukraine</i>)
Royal Irish Academy (<i>Ireland</i>)	Royal Society of Chemistry (<i>United Kingdom</i>)
Israel Academy of Sciences and Humanities (<i>Israel</i>)	National Academy of Sciences (<i>USA</i>)
	Programa de Desarrollo de Ciencias Básicas (<i>Uruguay</i>)



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