



IUPAC

Advancing Worldwide Chemistry

Biennial Report, 2000–2001

IUPAC's mission is to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of Mankind. In so doing, IUPAC promotes the norms, values, standards, and ethics of science and advocates the free exchange of scientific information and unimpeded access of scientists to participation in activities related to the chemical sciences.

IUPAC Biennial Report 2000–2001

Now in its 83rd year, the International Union of Pure and Applied Chemistry (IUPAC) continues to carry out a wide range of activities, with particular emphasis on establishing international standards of chemical nomenclature and terminology, sponsoring international scientific conferences, and fostering global communication in chemistry. Four years ago, IUPAC adopted its first Strategic Plan, based on ten long-range goals. These were slightly revised in 1999. During the 2000–2001 biennium, the Union has undertaken a number of initiatives in line with the Strategic Plan

and has made major changes in its structure and operations to address key issues.

This report lists IUPAC's long-range goals and provides some illustrations of 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 largely conducted under a formal project system, in which proposals from chemists worldwide are peer-reviewed and, if meritorious, are approved and supported.

IUPAC Activities (2000–2001) Summarized by Strategic Goals

Goal 1

IUPAC will serve as a scientific, international, nongovernmental body in objectively addressing global issues involving the chemical sciences. Where appropriate, IUPAC will represent the interests of chemistry in governmental and nongovernmental forums.

With the threat posed by chemical weapons gaining increased international attention, IUPAC has begun a process to advise the Organization for Prohibition of Chemical Weapons (OPCW) on scientific developments that might impact the Chemical Weapons Convention—a treaty that went into effect in 1997 and has been ratified by 145 countries. IUPAC was seen as the only organization that has the independence, expertise in chemistry, and international stature to conduct this assessment. A workshop will be held in Bergen, Norway in July 2002 to explore advances in relevant chemical synthesis methods, chemical processing, and analytical methodology. A report from the workshop will be presented to OPCW and the States Parties as input to the first Treaty Review Conference in April 2003. The workshop has received significant financial support from several foundations, governmental and nongovernmental organizations, and industry.

IUPAC has had long experience in the area of chemical weapons through its ad hoc



Committee on Chemical Weapons Destruction Technologies. This committee completed its report, which is to be published as the complete February issue of IUPAC's

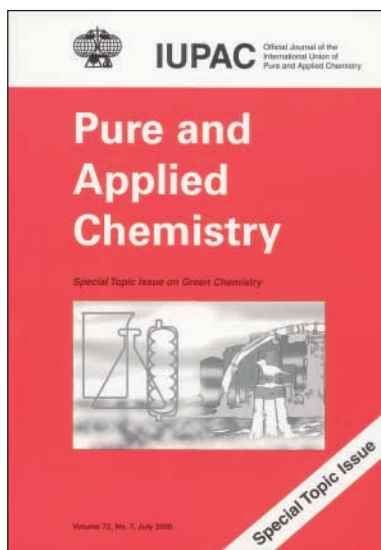
official journal *Pure and Applied Chemistry* and disseminated to the 145 States Parties.

An extensive project, “Molecular basis of biodiversity: Conservation and sustained innovative utilization”, was completed in 2001. The goal of the project was to devel-

op, by international consultations, consensus recommendations for mutually beneficial cooperation between scientists from bio-affluent regions on one side and universities as well as companies from highly industrialized countries on the other. The final recommendations will be published in *Pure and Applied Chemistry* in April 2002.

One of the Union's principal mechanisms for addressing global issues is the CHEMRAWN Program (*Chemical Research Applied to World Needs*), which has acted through a series of interdisciplinary international conferences, involving participation by world leaders from science and technology and also government, industry, and the concerned public. Each conference develops and distributes to decision-makers throughout the world a set of recommendations complete with planned follow-up actions through a Future Actions Committee. To date, 12 such conferences have taken place, and conferences are now planned during 2002–2003 on contributions of chemistry to clean energy and to fresh water.

The most recent CHEMRAWN conference “Toward Environmentally Benign Processes and Products” was held in Boulder, Colorado in June 2001. The conference dealt with the subject of green/sustainable chemistry, addressing the current state of the art in all aspects and types of chemical processes that reduce impacts on human health, energy consumption, and the environment. There were 80 contributed papers, an extensive poster session, and an educational workshop.



An IUPAC Workshop on Green Chemistry Education was held in coopera-

tion with the Organization for Economic Cooperation and Development (OECD) in Venice, Italy in September 2001. The workshop reviewed worldwide efforts in green chemistry and developed a *Guide for Green Chemistry Education*, which will aid in disseminating information on the field to students in all countries. A scientific review of the potential problem of endocrine disruptors, published as a special issue of *Pure and Applied Chemistry* in 1998, continues to attract attention and has been distributed by UNESCO to decision-makers in more than 70 countries. This report gave rise to a large project, now nearing completion, to assess the current state of the art in this field and to define additional research that is needed. The project will culminate in a workshop in Japan in 2002 and a comprehensive publication.

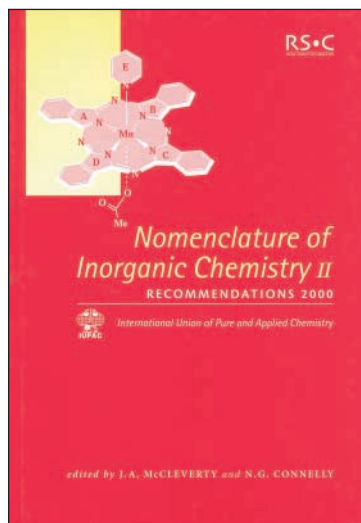
Goal 2

IUPAC will provide tools (e.g., standardized nomenclature and methods) and forums to help advance international research in the chemical sciences.

During the last biennium, IUPAC made an important reaffirmation of its leadership role in chemical nomenclature by consolidating all its systematic nomenclature activities in a new Division of Chemical Nomenclature and Structure Representation. The name of the Division emphasizes the critical place of computer-based molecular structure representation in relation to classical systematic names of chemicals. The Division is responsible for organic, inorganic, macromolecular, and biochemical nomenclature, which had been fragmented among four separate commissions. The organizational change was one outgrowth of a Strategy Roundtable in March 2000, which brought together about 40 representatives of industry and international trade and journal editors and publishers, along with nomenclature experts, to advise IUPAC on future programs in con-

ventional and computer-based nomenclature. Out of this meeting came a number of important projects. As President Alan Hayes told the IUPAC Council in Brisbane in 2001, "This effort is an example of the new IUPAC way of doing things. First the customers are asked what they need and how IUPAC can best contribute to meeting that need. Next, the question is asked, should IUPAC be doing this? Finally, a program or project is developed that addresses the expressed needs that involves both people who have been active in IUPAC and others who have not." The current program in nomenclature is being carried out with longtime contributors to IUPAC projects and with close interaction with such organizations as Chemical Abstracts Service, Beilstein, ACD Labs, and other nomenclature-based software organizations.

During 2001, revisions of three fundamental IUPAC reference books were completed, two in inorganic chemical nomenclature (Red Books I and II) and one on symbols and terminology in physical chemistry (Green Book). The existing publication on macromolecular nomenclature (Purple Book) and the compendium of analytical nomenclature (Orange Book) were made available on-line on the IUPAC Web site. A year after publication of the new editions of

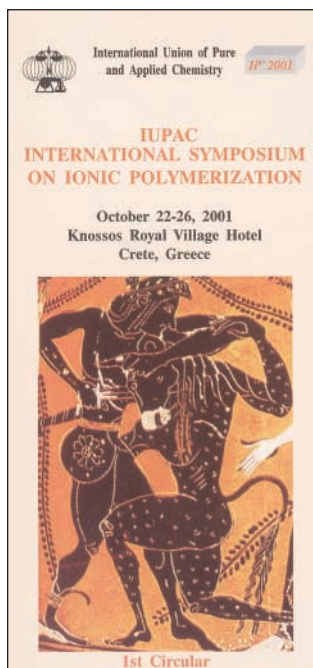


the Red and Green books, they will also be freely available on the Web site. Greater efforts have been made to disseminate information on nomenclature and terminology in other ways. For example, IUPAC's

Macromolecular Division held a roundtable between members of nomenclature and terminology task groups and the editors of major polymer journals.

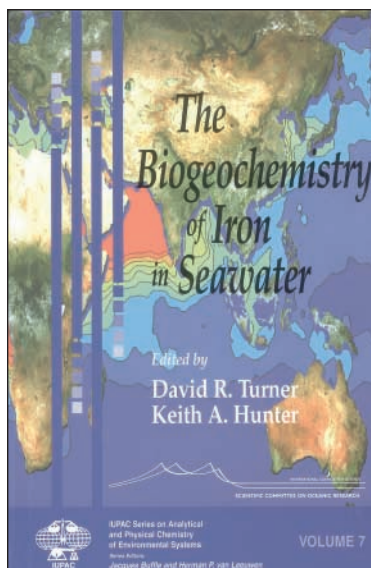
In collaboration with the International Union of Pure and Applied Physics, IUPAC formed a task group to establish priority of discovery/synthesis of elements 110–112 prior to the naming of these elements following IUPAC procedures. The Task Group's report was published in 2001, and the undisputed discoverers of element 110 have been consulted regarding a proposed name for the element. The task group is now considering claims for the discovery of elements 111, 112, 114, 116, and 118.

Recommendations on nomenclature, terminology, and conventions in a wide range of subjects were published, primarily in *Pure and Applied Chemistry*. Examples include nomenclature of lignans, terms in chemical speciation of trace elements, biological monitoring for exposure to volatile organic com-



pounds, measurement of NMR chemical shifts, data exchange standards for ion-molecule spectrometry, and definitions of terms relating to liquid crystals. An even broader array of subjects was included in technical reports and critical evaluation of data. Some examples include solubility data of various

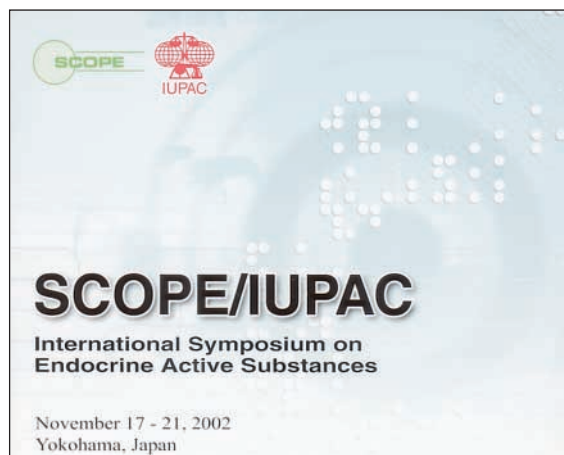
classes of compounds, pesticide application, ion-selective electrodes, determination of compounds in oils and fats, nuclear fission, air quality in the workplace, computational chemistry, properties and units in the clinical laboratory, kinetic data in atmospheric chemistry, heat capacities of liquids, pulse sequences in NMR spectroscopy, standards for microcalorimetry, and use of Legendre transforms in chemical thermodynamics. More than 50 reports were published in *Pure and Applied Chemistry* or other journals, three reports appeared in the Solubility Data Series, and eight books were published.



Goal 3

IUPAC will assist chemistry-related industry in its contributions 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. In addition, several IUPAC Officers have informal ties to industry associations, which provide guidance on areas in which IUPAC and the chemical and pharmaceutical industries interact.



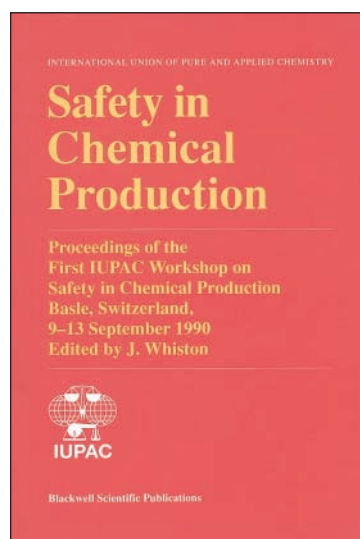
Many of the benefits accruing to industry from IUPAC activities are indirect. For example, the conferences described under Goal 4 exploring new developments in a wide range of chemical science are well attended by industrial as well as academic chemists. Likewise, most of the global issues discussed under Goal 1 are of crucial importance to industry. For example, the Chemical Weapons Convention provides for routine inspection of chemical manufacturing facilities. Since changes in the operation of the Convention following the Review Conference in 2003 could have significant

positive or negative impact on industry in many countries, IUPAC's scientific input is important. Also, the regulatory climate in such matters as endocrine disruptors 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 may have an impact in many countries that will directly affect industrial processes and products.

Under Goal 2, the advances in conventional and computer-based nomenclature described are being conducted with input from industrial chemists and provide an essential framework for conducting business, not only in laboratories, but also in international trade and patents. IUPAC provides in such cases the "chemical infrastructure" necessary for effective international communication in chemical research, development, manufacturing, and business.

Some IUPAC programs are particularly attuned to the worldwide chemical industry, such as COCI's Workshops on Safety in Chemical Production, which have been held

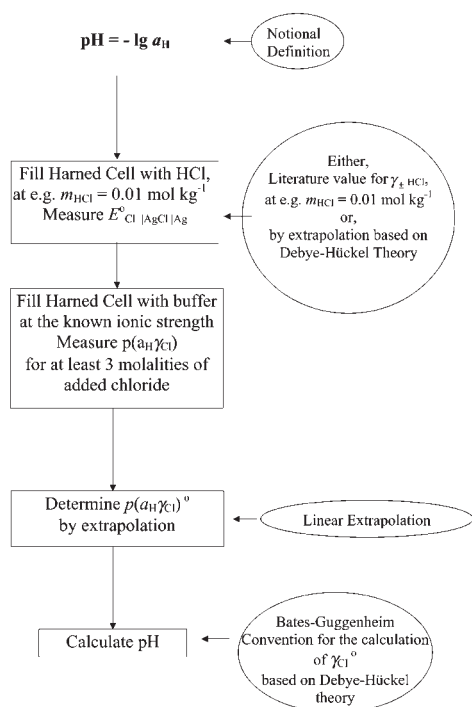
in several countries, and the Training Program for Safety and Environmental Protection. This program, carried out in conjunction with UNIDO and UNESCO, involves hands-on



training for several weeks in a developed country of individuals responsible for industrial plant safety from developing countries. Several European companies and, most recently, two companies in the United States have served as hosts. As more of the chemical industry moves to developing countries, the future image and viability of industrial chemistry depends increasingly on fostering sound manufacturing and safety practices worldwide.

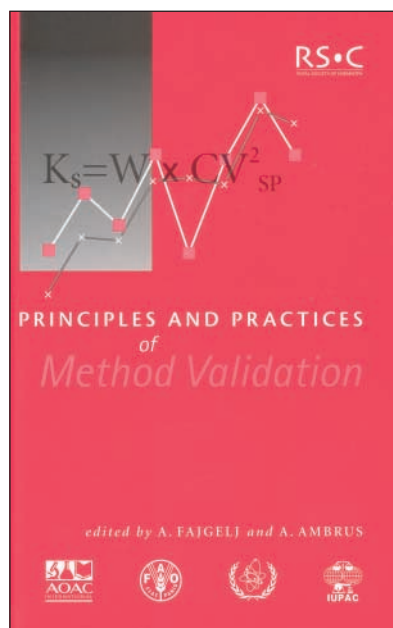
The Union makes a vital contribution to a number of International Measurement Evaluation Programs (IMEPs) that determine trace elements in areas as diverse as natural water, human serum, plastics, and automobile catalysts and that are of immense value to the chemical industry and to human health.

Several IUPAC projects of broad scope have important applications in the chemical industry. For example, the Task Group on the Redefinition of pH Scales has published a Provisional Recommendation, which will provide a sound basis for this internationally important metric. The task group included



Operation of the Harned Cell as a Primary Method for the Measurement of Absolute pH.

representatives of industry and several national metrology laboratories. Similarly, an



Inter-divisional Working Party on Harmonization of Quality Assurance Schemes has made significant contributions toward reaching international agreement on guide-

lines affecting industry.

Several projects are of direct relevance to the food and agrochemical industries. For example, a project on disposal and degradation of pesticide waste is being carried out in the context of pesticide registration and is related to activities in international plant protection organizations. The results of other projects on analysis of contaminants in food and in fats and oils are directly used by regulatory agencies and by advisory bodies to the food industry, which act partly also as cosponsors.

Following a well-received IUPAC publication on drug metabolism, a current project to establish a human drug metabolism database is being carried out in conjunction with the International Union of Pharmacology (IUPHAR) with substantial financial support from the International Council for Science (ICSU).

Currently, 109 industrial organizations in 21 countries participate in the Company Associate Program. Together with its National Adhering Organizations (NAOs), IUPAC Officers are making efforts to strengthen the interactions with Company Associates and to increase the number of participants.

Goal 4

IUPAC will facilitate the development of effective channels of communication in the international chemistry community.

IUPAC's constituency consists of the entire world of chemistry, both organizational and individual. Because IUPAC activities impact chemical organizations as well as individual chemists, it has a unique communications challenge. Continuing contacts are maintained with the NAOs (which are the Union's formal Members), and through the NAOs, IUPAC is in touch indirectly with national chemical organizations, industrial companies, and individual chemists. While channels of communication have been established to these constituencies much effort is underway to improve them.

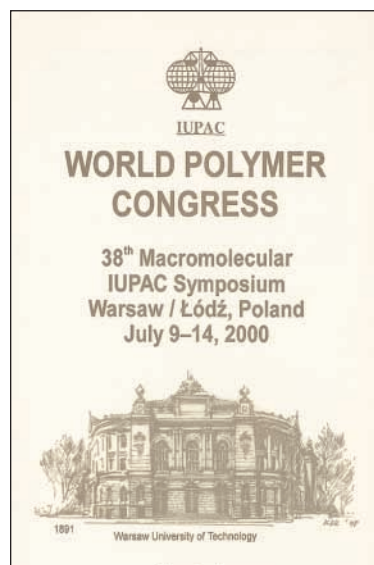
The Secretariat is concentrating on development of means for effective international electronic communication. During 2000–2001, the Secretariat has assisted the Committees and Commissions of IUPAC to develop the IUPAC Web site as a reliable source of information, not only about IUPAC, but also as a facile means to link to other Web sites of interest to chemical scientists. Activity on the IUPAC Web site increased over a factor of eight during the last biennium, with about 224,000 hits per

month in 2001. All IUPAC Recommendations and Technical Reports, as well as an increasing number of basic nomenclature and terminology books, are available free through the Web site. The full contents of *Pure and Applied Chemistry* are available by electronic subscription.

IUPAC's wide range of conferences, from the biennial Congress to a large number of more specialized congresses and symposia, provide a major means of communication with the world's

chemists. For example, the World Polymer Congress is a biennial conference organized by IUPAC and routinely attracts over 1000 participants, while specialized meetings, such as a recent Workshop on Quality Assurance, attracted 120 participants from 34 countries—scientists and representatives of agencies, governments, and standardization and accreditation bodies involved in method validation or in acceptance of analytical methods for legislative purposes.

The biennial IUPAC Congress, organized by the Royal Australian Chemical Institute, was held in Brisbane, Australia in July 2001. This was the first IUPAC Congress in the southern hemisphere since 1969 and attracted over 1200 participants. A broad program of lectures, featuring Nobel laureates and



IUPAC

SERVING THE CHEMISTRY COMMUNITY WORLDWIDE

The International Union of Pure and Applied Chemistry serves to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of mankind. As a scientific, international, non-governmental and apolitical body IUPAC can address many global issues involving the chemical sciences.

ABOUT | FAQ | CONTACT | HANDBOOK

NOMENCLATURE & SYMBOLS
CHEMICAL ELEMENTS
EDUCATION
INDUSTRY
PUBLICATIONS

SPOTLIGHT

ACD
The Analytical Chemistry Division President, David Moore, explains what the Division does and how its members do it.

XML in Chemistry
In the Maze of XML, what place is there for Chemistry? what role is there for IUPAC? A review of the Union's position and options presented by T. Davies.

NEWS

In a changing world
A message from the current IUPAC Vice President, Leiv K. Sydnes.

Chemistry International
The July 2002 issue is posted.

e-NEWS
Most recent issue e-mailed June 28

other leading scientists, covered new developments in the chemical sciences and applications to such areas as biomedicine and materials science.

During 2000–2001, IUPAC sponsored 52 conferences, which were held in 28 countries. These conferences covered a wide range of topics ranging from nanostructured materials to natural products and from medicinal chemistry to thermodynamics and analytical chemistry. Proceedings from most conferences were published in *Pure and Applied Chemistry* or in *Macromolecular Symposia*.



Goal 5

IUPAC will promote the service of chemistry to society in both developed and developing countries.

In addition to the consideration of broad problems of societal interest, as discussed under Goal 1, IUPAC recognizes obligations to society in general, often outside the immediate realm of chemistry. In developed countries, such obligations frequently take the form of participation in international organizations devoted to science, health, metrology, and standardization, as well as the provision of chemical information of general value to the public. In developing countries, IUPAC has undertaken a number of projects that contribute to the development of various aspects of chemistry.

IUPAC has formal and informal ties to international organizations that impinge on every aspect of individual and commercial society [e.g., the International Organization for Standardization (ISO), the International Committee on Weights and Measures (BIPM), and various committees of ICSU]. These contacts, through such bodies as the Interdivisional Committee on Terminology, Nomenclature and Symbols, the Working Party on Quality Assurance, and the Division of Chemistry and Human Health, permit the voice of chemistry to be heard when international standards in a variety of

disparate fields are promulgated. The names of chemicals, which are often ignored by chemists in using chemical formulas and computer-generated tables, are important in the legal and regulatory arenas, and the standardization of chemical measurement and analytical methods are of crucial importance to commerce and society.

IUPAC's central position in dealing with chemistry in developing and economically disadvantaged countries led to a request from a number of leading national chemical societies to organize a meeting on Sharing Responsibility for our Science: Chemistry Across National Boundaries.



The meeting was held in Brisbane, Australia in July 2001 as part of the IUPAC-organized World Chemistry Leadership Meeting. The participants, from both economically

advanced and developing countries, agreed on a set of observations regarding problems faced by many developing countries and on a set of actions that can be taken by IUPAC, national chemical societies, industry, and UNESCO.

A program of financial support for conferences in developing and economically disadvantaged countries that are full Members of IUPAC was established in 1999, to run for a trial period of four years. During 2000–2001, USD 40,000 was allocated to five international conferences—in India, Hungary, Greece, Bulgaria, and Turkey—to

support travel for eminent international scientists who presented invited lectures.

A number of IUPAC projects contain an element of training of scientists, primarily in developing and transitional countries, through workshops supported by IUPAC, along with other organizations such as the International Organization for Chemistry in Development (IOCD), UNESCO, and industry. During the last biennium, such workshops in macromolecular chemistry and in environmental chemistry have been held in the Czech Republic, South Africa, Brazil, China, Hungary, Israel, Poland, and Taiwan.

Goal 6

IUPAC will utilize its global perspective to contribute toward the enhancement of education in chemistry and to advance the public understanding of chemistry and the scientific method.

IUPAC has long had a Committee on Teaching of Chemistry (CTC), primarily devoted to secondary education in developing countries. Those activities continue, as illustrated below. However, during 2000–2001, an in-depth study was initiated of the Union's optimum role in chemistry education. Following input from a large number of IUPAC's NAOs and national chemical societies in both large and small countries, a strategy was developed to broaden the scope of IUPAC's efforts in ways that complement and coordinate much larger national and international programs. Organizationally, CTC was restructured to a broader-based Committee on Chemistry Education, with subcommittees specifically devoted to chemistry in developing countries and to the public understanding of chemistry. The new programs began in January 2002.

Meanwhile, the International Conference on Chemical Education (ICCE) continues as a major IUPAC-sponsored meeting. The 16th ICCE was held in Budapest, Hungary in August 2000 and attracted more than

500 delegates, including 200 school chemistry teachers from the region.

During the biennium, a CHEMRAWN conference was held on The Globalization of Chemical Education: Preparing Chemical Scientists and Engineers for Transnational Industries. Rather than the customary single large conference, this project utilized a series of full-day sessions as part of other worldwide conferences—the first at the 16th ICCE in Budapest; the second at the American Chemical Society meeting, Washington DC, August 2000; and the third at Pacifichem, Honolulu, December 2000; with a final session incorporating a Future Actions discussion as part of the IUPAC General Assembly in Brisbane, Australia, July 2001. Abstracts of the papers presented at the three mini-conferences will be posted on the IUPAC Web site to permit continuing discussions. The experiment appears to be successful, gaining many of the objectives and benefits of a major CHEMRAWN conference, but with greater flexibility, less organizational effort, broader involvement, continuing discussions, and minimal fund raising.

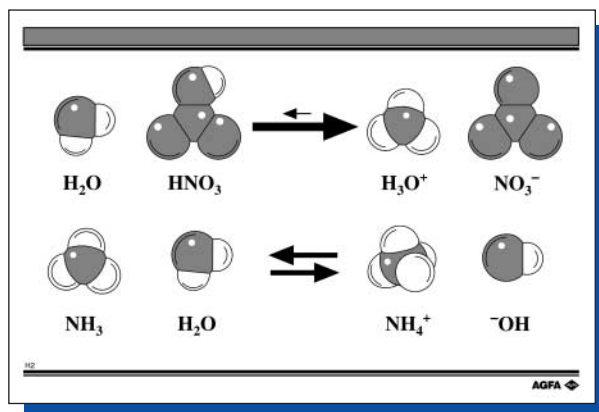
DIDAC, a program for the teaching of chemistry in developing countries via specially prepared overhead transparencies and colored posters, has proven extremely successful. With support by UNESCO in excess of USD 100,000, this Belgian-developed tool has been translated into French, Arabic, Korean, Russian, and other languages. Over 30 developing countries have become involved in the program coordinated through CTC(CCE)/COCI.

The long-term IUPAC project on small-scale chemistry continues at a rapid pace in collaboration with UNESCO, which provides very substantial financial support. During 2000–2001, UNESCO–IUPAC

workshops have been conducted to introduce and advocate the benefits of small-scale, low-cost practical chemistry in Armenia, Belarus, Benin, Burkina Faso,

Burundi, Cameroon, Chad, Estonia, Gabon, Gambia, Georgia, Guinea, Guyana, Iran, Jamaica, Lesotho, Lithuania, Mali, Mexico, Niger, Senegal, Trinidad, and Yemen. This low-cost approach is of critical importance to teaching

chemistry in developing countries. To facilitate local development, workbooks with example experiments have been or are in process of being translated into French, Portuguese, Russian, Arabic, Persian, and Estonian.



Goal 7

IUPAC will make special efforts to encourage the career development of young chemists.

IUPAC recognizes that the future development of the chemical sciences lies largely in the hands of the younger generation of scientists, who often encounter severe obstacles in an era of constrained resources. As one tangible expression of support, the Union established the IUPAC Prize for Young Chemists to encourage outstanding young research scientists at the beginning of their careers. This prize is given for the most outstanding Ph.D. thesis in the general area of the chemical sciences, as described in a

1000-word essay. During 2000–2001, nine awards were made, each consisting of USD

1000 cash and travel expenses to the IUPAC Congress in Brisbane, Australia in 2001. Awards were made to young scientists who received their doctoral degrees in Japan, India, Italy, Germany, Australia, and the United States.

Special funds have been set aside by the organizers of a number of IUPAC-sponsored meetings to permit young chemists to participate. For example,

International Union of Pure and Applied Chemistry

IUPAC
announces the 2003

IUPAC Prize for Young Chemists

The IUPAC Prize for Young Chemists has been established to encourage outstanding **young research scientists** at the beginning of their careers. The prize will be given for the **most outstanding Ph.D. thesis** in the general area of the **chemical sciences**, as described in a 1000-word essay.

Prize USD 1 000 and travel
to the IUPAC Congress in Ottawa, Canada, August 2003

Each awardee will be invited to present a poster on his/her research and to participate in a plenary award session.

Call for Nominations
(deadline February 1, 2003)

IUPAC and the Royal Australian Chemical Institute jointly provided USD 50,000 to bring young scientists from developing countries to the IUPAC Congress in Brisbane. Several other NAOs also provided special funding for young chemists from their countries to attend the General Assembly and Congress.

Concerted efforts are now being made to

interest younger chemists in the work of IUPAC. Formerly, the Union was organized around commissions of largely senior chemists who were acknowledged experts in a particular specialized field. With the introduction of the project-driven system in 1999, it is easier for younger scientists to participate in a short-term project in the area of their immediate interest and expertise.

Goal 8

IUPAC will broaden the geographical base of the Union and ensure that its human capital is drawn from all segments of the world chemistry community.

IUPAC's membership consists of 44 NAOs, with an additional 22 Associate NAOs. While this representation includes the countries that provide over 85 % of the chemical manufacturing in the world, there are still a number of countries with major chemical enterprises that do not participate in IUPAC activities. The principal strength of IUPAC lies in its broad, almost global, coverage, and its programs are strengthened by inclusion of chemists from all countries that have significant activities in the chemical sciences and in the chemical industry. The Membership Development Committee is targeting for special attention countries that have the scientific and economic capacity to join IUPAC.

At present, 32 other international scientific organizations have applied for and been granted the status of IUPAC Associated Organizations (AOs). These organizations range from regional chemistry federations to

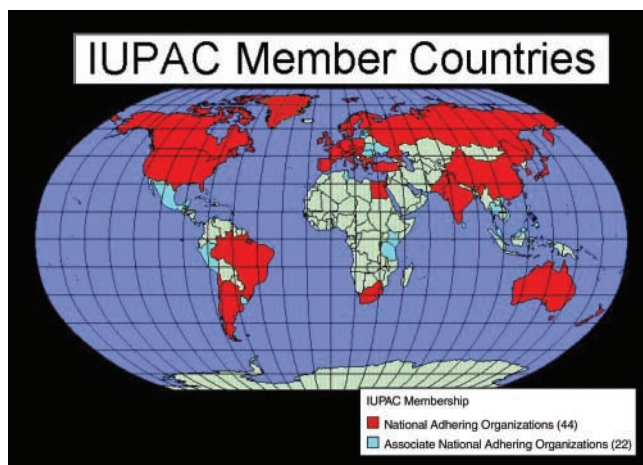
societies dedicated to a specific discipline. IUPAC is endeavoring to establish more active programs with many AOs in order to extend its reach both scientifically and geographically.

At the individual chemist level, IUPAC has direct contact with about 4500 interested scientists in 45 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.

The IUPAC Fellows Program, established in 1997, offers Fellowship to individuals who have completed service on IUPAC bodies.



Currently, there are approximately 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 that carry

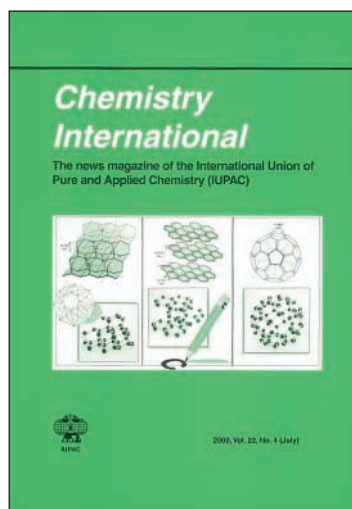
out projects may come from anywhere, even countries not currently associated with IUPAC, thus broadening the global reach of IUPAC. Likewise, information on the Union that is disseminated at IUPAC-sponsored conferences serves to acquaint a wider circle of chemists with IUPAC's work and encourage participation.

Goal 9

IUPAC will encourage worldwide dissemination of information about the activities of the Union.

In the past, IUPAC has often failed to provide information about its activities in a form that is readily visible and comprehensible to the broad community of chemists, the chemical and pharmaceutical industries, and the public. During the last biennium, greater efforts have been undertaken to publicize the work of the Union in a number of ways:

- All provisional and final recommendations and all final reports from IUPAC projects are freely available on the IUPAC Web site. Comments on provisional recommendations are solicited widely.
 - All basic nomenclature and terminology books are available or will be made available on the Web site.
 - Two commercial chemical database providers furnish IUPAC names for organic compounds on referral from the IUPAC Web site.
 - Information about new and completed projects and a wide range of news about IUPAC activities appears regularly in *IUPAC e-News*, a complimentary e-mail newsletter.
 - *Chemistry International*, IUPAC's bimonthly news magazine, was revamped to provide more readable articles covering information about IUPAC and about international scientific activities.
- When appropriate, news releases are sent to national chemistry news magazines and other publications in order to publicize particular IUPAC activities.
 - Each proposal for a new IUPAC project requires a dissemination plan. The results are often published in *Pure and Applied Chemistry* and allowed to become part of the scientific literature. However, the Task Group responsible for the project is expected also to make positive efforts to disseminate the information to the interested community and make efforts to encourage adoption of IUPAC recommendations. For example, one recent publication in an area of



spectroscopy has been republished in whole or part in four major journals in the field and presented orally or in a poster at three international meetings.

- IUPAC has introduced a formal process for retrospective evaluation of the impact of projects. From the evaluation, information will become available that can be supplied to NAOs, industry contacts, news magazines, and others that not only report what has been done in proj-

ects but provides data on their importance and potential applications.

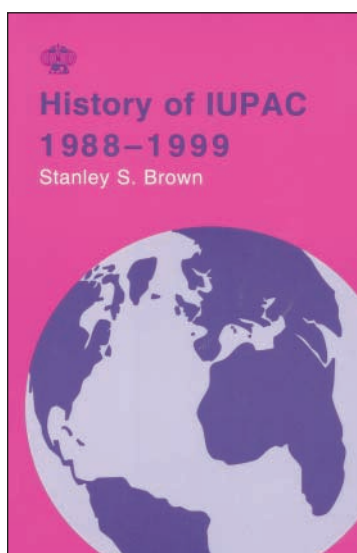
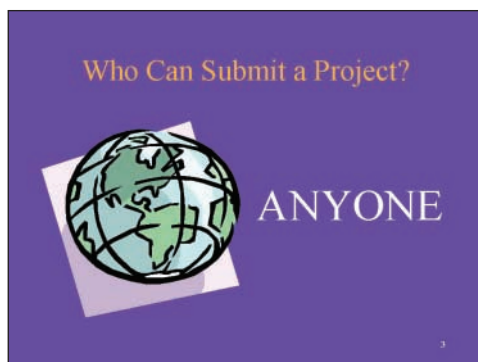
- At each IUPAC-sponsored conference, an official representative presents a short message from the Union. Suitable material is supplied to permit and encourage the representative to provide a brief review of current IUPAC activities, and printed brochures are supplied for distribution to conference attendees.

Goal 10

IUPAC will assure sound management of its resources to provide maximum value for the funds invested in the Union.

As a volunteer organization, IUPAC accomplishes its goals through both the volunteer expertise and time of its dedicated members and the stable financial support of its NAOs. IUPAC funds are used primarily to support projects and the work of various committees, along with a small staff at the Secretariat. IUPAC has a continuing responsibility to demonstrate to its sponsors that all relevant management tools, including the use of modern information technology, are employed to maximize productivity in the administration of the Union.

The funds invested in projects and in management, planning, and oversight are very highly leveraged, since scientists working on IUPAC projects volunteer their time.



The primary expenses in operating IUPAC programs are for travel when it is necessary for a group to have face-to-face contact. However, most work is now conducted by e-mail.

The project-driven system introduced in 1999 ensures that each proposal is evaluated objectively *before* resources are committed, and the level of resources required can be monitored as the project progresses. The targeting of funds to active projects and the ability to provide funding as needed in a given time period improve accountability and accelerate the completion of high-priority projects. The ability to post documents for comment and modification on the IUPAC Web site and/or other sites has greatly increased the

speed and efficiency of carrying out projects. IUPAC is sometimes able to obtain funds for specific projects from outside sources, such as ICSU, UNESCO, foundations, governments, and industry.

The Secretariat, in Research Triangle Park, North Carolina, USA, continues to operate efficiently, with a total staff of five, primarily professional, augmented by outsourcing specific tasks. In addition to handling all administrative and financial matters, the Secretariat provides direct program support to the Divisions in the project review

system and in conference sponsorship; it is responsible for maintaining the IUPAC Web site; and it handles all publications.

With prudent fiscal management and sound investment policies put in practice during the last decade, the Union has been able to maintain operating reserves and to create a small endowment. Income from investments, publications and—especially—national subscriptions from NAOs is adequate to support the programs outlined in this document.

