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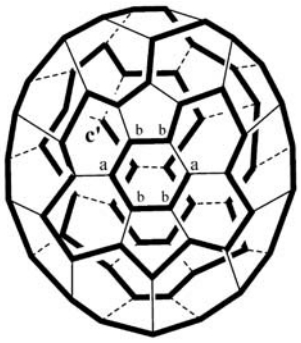

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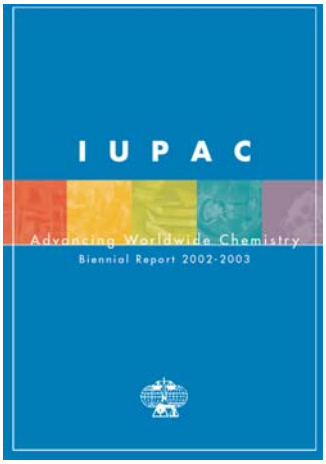


Enclosed with this issue is the IUPAC Biennial Report 2002-2003

Vice President's Column

Extending the Role of IUPAC Within the Worldwide Chemistry Community

by Bryan R. Henry

As this is the first opportunity that I have to address the entire IUPAC community, please allow me to begin with an expression of sincere gratitude. The opportunity to be involved with IUPAC at the executive level is a great privilege. It is also a daunting challenge, especially when one considers the list of past executive members and reflects upon their very successful contributions over the last several years. IUPAC is a dynamic, successful, and significant organization that effectively serves the worldwide chemistry community, and this is due in no small measure to their collective efforts. However, credit for the success of IUPAC certainly does not end at the executive level, but extends throughout the organization to the countless volunteers who unselfishly give so many hours of their valuable time. My challenge is to try to make some contributions that will allow us to improve upon our success.

Bryan R. Henry
IUPAC Vice President
2004–2005

The first task for the vice president is to prepare "a critical assessment of the programs and the projects of all IUPAC bodies." The quote refers to our Statutes. Here I will follow the lead of past VPs and not attempt what would seem to be a virtually undoable task in the allotted time. Rather I will focus on a few aspects of IUPAC activities. In particular, I propose to make a critical review of the current project system. Another area that deserves attention is examining ways to improve the involvement of chemical industry in IUPAC activities.

The project system is at the very heart of the activities of IUPAC. Our new method of operation was passed by the Bureau in 1998, approved by Council in 1999, and fully implemented in the 2002–2003 biennium. What is working well? Where are the problems? How can any difficulties be addressed?

I have read some reports of division activities and minutes of the division presidents' meetings. This material has been very helpful in giving a picture of the challenges faced by the Divisions in implementing the new project system. However I believe that I need to listen and learn directly from the divisions and their officers. They are in the best position to identify problems and to suggest remedies. To that end, I have begun to attend some of the Division meetings in 2004. Issues such as project generation, monitoring and evaluation, personnel, funding, and dissemination have already been identified by many divisions as critical to a successful system. As an organization, I believe that we need to be flexible in our approach. While the current project system may be more versatile and adaptable, we must maintain the opportunity for face-to-face communication where that is the most efficient path to a desired goal. We need input, particularly from the divisions, as we try to identify the appropriate balance in our endeavors.

While the current project system may be more versatile and adaptable, we must maintain the opportunity for face-to-face communication . . .

Beyond the divisions, how can the project system help with other activities such as the work of CCE, COCI, CHEMRAWN, and our attempts to reach out to the developing world? CCE has had a marked increase in their activities and we need to facilitate their full involvement in the project system. COCI is involved in a number of new initiatives and we need to determine if the project system can be used to better serve the needs of industry. CHEMRAWN is an important part of our outreach to the developing world, and over the years they have organized a series of very successful conferences. In many cases these conferences have been followed by future action committees. Can we use the project system more fully

to capitalize on these successes and initiate projects devoted to concrete actions that will make the world a better place.

If IUPAC is to continue to prosper and take on an ever-increasing diversity of worldwide activities, we must ensure that all of the various components work cooperatively towards our common goals. Increased dialog between officers, staff, divisions, and committees will be critically important as we move away from some of our long held traditions, and more of our work is done outside of the General Assembly. In that sense, hopefully the visits to gather data for the vice president's critical assessment will contribute to that desirable integration.

In a recent column in *CI* (May-June 2003, p. 2), Ed Przybylowicz challenged IUPAC to find ways to increase the contributions of science to world peace and prosperity. As Ed pointed out, we have had many notable successes but how can we move forward. Often our successes have arisen through cooperation with other agencies. For example we have had particularly fruitful collaborations over the years with UNESCO. In addition, it may be possible to broaden our collaborations and to explore closer ties with organizations such as the International Council for Science, United Nations International Development Organization, and International Atomic Energy Agency.

Finally, beyond the project system I believe we need to look at other ways of improving our usefulness to the chemical industry and involving it more closely in our activities.

Is it possible to make inroads with the pharmaceutical and small chemical process industries? Can we use the trade associations to help us in this process? What can we do about getting suggestions for continuing contacts to provide better service to our existing Company Associates? Can we help industry in the internationalization of initiatives like Responsible Care? One area I believe we need to exploit is our role as an internationally based, independent nongovernmental organization. Our publications on the chlorine issue and on endocrine disruptors are just the kind of material that can be used by industry in influencing decision makers and bringing rationality to chemical issues that are often clouded by emotion. Industry can help us and can promote their own interests by guiding IUPAC to further areas in which we can play a constructive role.

One area I believe we need to exploit is our role as an internationally based, independent nongovernmental organization.

Much of what appears in this article has been gleaned from my discussions with IUPAC friends and colleagues, and from reading what others have written. My hope is that, with the continuation of a little help from my friends, I can assist IUPAC to play an even larger positive role in the worldwide chemistry community.

Bryan Henry <chmhenry@uoguelph.ca> became IUPAC vice president (president elect) on 1 January 2004.

Short Bio on Bryan Henry

Bryan Henry began his two-year term as IUPAC president elect and vice president on 1 January 2004. In 1963, Prof. Henry received his bachelor's degree from the University of British Columbia; he later earned his doctorate at Florida State University, USA. Between 1969 and 1986, Prof. Henry was an associate professor, a professor, and Department of Chemistry head at the University of Manitoba. Currently, Bryan Henry is a professor of chemistry at the Department of Chemistry and Biochemistry at the University of Guelph.

Bryan Henry has served as vice president and president of the Canadian Society for Chemistry, and as chair and vice chair of the Chemical Institute of Canada. A member of the Canadian Section of the Society of Chemical Industry since 1992, he has been both chair and vice chair. He was also a member of the Editorial Advisory Board of the *Canadian Journal of Chemistry* (1996–1998). Additionally, he was part of the Selection Committee for the Canadian Science and Engineering Hall of Fame from 1996 to 2000.

Prof. Henry has been a member of the Canadian National Committee for IUPAC since 1995, and served as chair (1998–2003). He was the scientific program chair of the 39th IUPAC Congress, which was held concurrently with the 42nd General Assembly in Ottawa, Canada, in August 2003.

The Year of Chemistry in Germany 2003

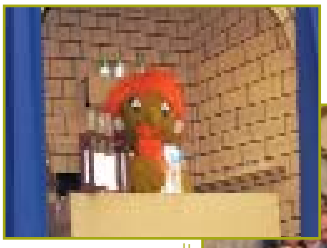
by Holger Bengs and Wolfram Koch

In Germany, 2003 was the official Year of Chemistry. The events of the Year of Chemistry comprised a colorful blend of major, central events and a large number of local events all over the country, which were organized and carried out by many committed men and women in chemistry. At the end of these 365 exciting days devoted to chemistry, everyone involved was very satisfied.

Many people became enthralled by this up-to-the minute, fascinating, and relevant science. Visitors, many of them children and young people, experienced the greatest "Eureka" moments when they saw things that related to their own lives and the world around them. According to information from the Federal Ministry for Education and Research, and from Holger Bengs, who acted as coordinator of the Year of Chemistry on behalf of the Gesellschaft Deutscher Chemiker (GDCh, German Chemical Society), well over one million visitors attended more than 2000 individual events, which were held all over Germany.

From the Idea to the Launch in January 2003

It was in 1999 that the Stifterverband für die Deutsche Wissenschaft (Association of Donors for the Promotion of the Sciences and Humanities in Germany), and major science organizations, decided to launch the "PUSH" initiative (Public Understanding of Science and the Humanities), as a result of which the Federal Ministry for Education and Research and the German Physical Society declared the year 2000 to be the Year of Physics. The campaign lasted all year and was conducted in consultation with the initiative Wissenschaft im Dialog (Science in Dialog), a forum of the leading German science organizations. The idea of "science years" earned much respect and was extended to the Year of Life Sciences (2001) and the Year of Earth Sciences (2002).



By a happy coincidence, the publicity campaign for the Year of Chemistry overlapped with the 200th anniversary of the birth of the most famous and influential chemist of the 19th century, Justus Liebig. Through his work on the development of analytical methods and new laboratory equipment, and his pioneering research in the field of artificial fertilizers and plant cultivation, but perhaps most of all through his famous meat-extract, the name of Justus Liebig became known all over the world. The Gesellschaft Deutscher Chemiker took this opportunity to propose to the Federal Ministry for Education and Research, that they should jointly celebrate the year 2003 as The Year of Chemistry. So it was that the 12-month project, combining the Liebig jubilee with the Year of Chemistry, was launched to great media acclaim, with a fireworks display at the Brandenburg Gate on 1 January 2003.

The Objectives and Involvement of Many Minds and Hands

As the German federal government sees it, the purpose of science years is to promote a dialogue between scientists and an interested lay public; and naturally in a country like Germany—whose greatest resource is its brainpower—another aim is to generate interest in science and technology. The Year of Chemistry was by now the fourth in the series of science years and so, in many ways, it was possible to draw on the experience of previous years. Nevertheless, it is important to note that chemistry is one of the most important factors in the German economy. In preparing for the Year of Chemistry, everyone involved held to the following principles:

- Chemistry is the fascinating science of molecules, their reactions, properties, and effects.
- Chemistry is a basic scientific discipline of great importance to research and development.
- Chemistry and its products are present in every aspect of daily life.
- The chemical industry is one of the most important in Germany and is a major employer of qualified staff.

Under the leadership of the Gesellschaft Deutscher Chemiker, all other important chemical organizations, both in science and industry, took part in the planning and implementation of this project. Those involved included other chemical learned societies such as the Deutsche Bunsengesellschaft für Physikalische Chemie (German Bunsen Society for Physical Chemistry); DECHEMA (Society for Chemical Engineering and Biotechnology), the chemical industry association with around 1600 member companies; the employers' federation; and the union for the chemical industry.

Event Formats and Examples

The Year of Chemistry featured numerous "experiment afternoons" that attracted and amazed participants. It was particularly the events where children and young people took part, whether as spectators or experimenters, which conveyed an atmosphere of excitement, and stimulated an appetite for more, but most of all tempted people to join in the experiments. The events included experiment shows, lectures, exhibitions, and discussions. A totally new and, for chemistry, unusually inspiring form of access, was provided by painting and drawing competitions for toddlers and school children. There was also a puppet show for children, sponsored by the Justus Liebig bicentennial, as well as the "Kekulé's Dream" dance theater.

The Campaign: Year of Chemistry 2003

The flagship of the Year of Chemistry campaign was a tripartite exhibition devoted to three important themes: "man," "matter," and "future and resources." *The Kiss: Magic and Chemistry* was the name of the exhibition used to illustrate the first theme. By focusing on the chemistry of the human body, the exhibition provided a valuable symbol for the whole year. *The Kiss: Magic and Chemistry* not only attracted a lot of attention from teenagers, by explaining the biochemical processes that take place when they fall in love and kiss, but it was also a draw for adults. Minister for Education and Research Edelgard Bulmahn, opened a press conference with the remark: "Kissing makes you slim. So now I know why *I'm* so slim." The exhibition also featured the chemistry of nutrition and health.

The two other exhibitions were devoted to chemistry in everyday life, today and in the future: *The Material: Matter and Chemistry* and *The Source: Energy and Chemistry*. The novelty of this concept was that for the first time in a science year, each of these exhibitions were shown in three major cities and thus travelled around virtually the whole Federal Republic. In each venue the exhibitions were chiefly manned by scientists and students from the local university, which also augmented the exhibition with experiments from its laboratories.

Great fun was also had in *Justus*, a 54-foot long "chemistry truck" fitted with small laboratories, which visited a total of 115 town centers and school playgrounds. In the truck, a total of 60 000 children, equipped with white coats and protective goggles, were able to have hands-on experience conducting simple experiments. Reactions producing changes in color were just as popular as the chromatographic resolution of the dyes in toy rubber bears.

The Summer of Science

In 2003, the Summer of Science, a festival held every year as part of the Science in Dialogue initiative, took place over one week in Mainz, the capital of the state of Rhineland-Palatinate. The idea is that everything—well, almost everything—in the chosen city should revolve around science. During the festival, laboratories and institutes open their doors to the public in a Long Night of the Sciences, exhibitions show the interfaces between art and science, and in symposia, talk-shows and cultural events, such as a chemistry-oriented film festival, current issues and research-findings are presented and discussed. Scientific researchers go out into the streets and into market squares to engage visitors in discussion. In this way they find out through dialogue what it is that concerns people about modern research and technology. Junior laboratories and interactive exhibitions for children and young people bring out the chemist and the inventor in each of them. The attractions even

included a 490-foot long motor boat, the *Chemie* (Chemistry), which spent three months visiting a total of 26 towns and cities. Over 40 000 visitors experienced this interactive exhibition.

Activities of the Gesellschaft Deutscher Chemiker (GDCh)

The GDCh was not only responsible for overall coordination of the Year of Chemistry, but with its 27 000 members it also played an active part in many of the events. Through its more than 60 local sections and 24 divisions and its 39 Young Chemist forums—which attracted some 5000 students and other young members—the GDCh attracted attention to itself and to chemistry. Particular success can be ascribed to all those events in which the regular colloquia of the GDCh were devoted to subjects of broad public interest and were held in unusual locations. For example, lectures on chemistry were warmly received in town halls, museums and old castles, and even in the open air. The really good thing about this was that, by stepping out from the lecture hall into unusual and, for many of them, unfamiliar surroundings, the chemists reached the lay public who would otherwise be hard to lure into university institutes.

Another special event was the Week of Chemistry, which was held in October in parallel with the annual conference of the Gesellschaft Deutscher Chemiker in Munich. There was particular interest here in the lecture by the Paris-based author and expert in "molecular gastronomy," This-Benckhard, who revealed to an amazed audience of several hundred just how much chemistry and physics are to be found in a single hen's egg.

Other Highlights

Other highlights of the Year of Chemistry included the nationwide Open-Door Day in chemistry. More than 200 chemical companies and nearly 50 research establishments and other chemistry-related establishments attracted over 400 000 visitors. This was a larger number than attended, in the same period, all the soccer matches in the nine stadiums of the Federal League (*Bundesliga*). Nor should we omit to mention the education summit in which the Gesellschaft Deutscher Chemiker played a leading part. Here, new concepts and methodology for the teaching of sciences were presented to the public. The basis for the discussions about tomorrow's chemistry teaching had been previously developed by numerous experts in workshops held up and down the country. The birthday of Justus Liebig was celebrated in Giessen in May. Its climax was the formal inclusion of Liebig's original laboratory, now the Liebig Museum, in the GDCh's Historical Chemical Landmark program. Altogether, the Liebig bicentennial was an event that received international acclaim.

Summing Up

It would be premature to try at this stage to assess what long-term success has been achieved, though the extremely high level of commitment by all concerned, in raising the profile of the science and achieving a better understanding of how chemistry connects with other sciences and with the world in general. It would surely also be wrong to claim that we got everything right. But without false modesty we can state with certainty that all the effort has been great fun—especially when people asked us questions and children's eyes sparkled—and, above all, we have all learned a great deal as well. In science we are all experts in our own field. When it comes to making our own research comprehensible to others, we can still learn a lot, especially about how to overcome inner barriers and dismantle obstacles. In this way the dealings we have with the public, still often uncertain, can be steadily improved to the benefit of all.

The Year of Chemistry, in conjunction with Justus Liebig's bicentennial, was an extremely good opportunity to do this and has been a thoroughly encouraging start. All of us who took part want to build on what we have learned about the marketing of our own science and take it forward beyond the end of the Year of Chemistry. There are many opportunities to maintain our commitment at the same high level. In January of this year, Germany ushered in its fifth year of science—the Year of Technology. And technology, like chemistry, is a very inter-disciplinary area of activity. In 2004, too, members of the Gesellschaft Deutscher Chemiker will again be actively involved, whenever it is a matter of seeking a dialogue with ordinary people, away from the laboratories.

Dr Holger Bengs was coordinator for the Year of Chemistry. Prof. Dr Wolfram Koch <W.Koch@gdch.de> is executive director of the Gesellschaft Deutscher Chemiker.

www.year-of-chemistry.de

Research and Education in the Middle East

by John M. Malin

In regions where political and cultural conflicts are overwhelming, can science improve the quality of life? This basic question has been addressed recently by a group of 57 scientists from 15 nations, including 35 chemists and chemical engineers from Middle Eastern countries who all met in neutral ground to discuss and share common problems. This first-of-its-kind meeting, held 6–11 December 2003 in Malta, aimed to foster relationships among chemical scientists from throughout the Middle East who otherwise might not have the opportunity to interact with one another. Attendees included six Egyptians, three Iranians, seven Israelis, five Jordanians, and eight from the Palestinian Authority. The rest of the participants were chemists and chemical engineers from Kuwait, Lebanon, Turkey, United Arab Emirates, Saudi Arabia, the United Kingdom, France, Germany, South Africa, Taiwan, and the United States.

In his letter of welcome, Guido de Marco, president of Malta, succinctly framed the issues that conference participants faced: "Depletion of resources, environmental degradation, a widening gap in technology, and shrinking water supplies are an indication of the mammoth challenges facing this region . . ." But, de Marco added, "Collaboration and sharing of information among scientists of this region can make a world of difference . . . you can lead the change, you can be successful where politicians seem to be failing. Improving the standards of living of the peoples in this region is after all the best way to fight terrorism. . . . You are putting science to the service of humanity by seeking how to, through research and education in the troubled region of the Middle East, convert frontiers into bridges; how to use science to improve the standards of living in this part of our world . . ."

Meeting Planning and Organization

The American Chemical Society's (ACS's) Subcommittee on Scientific Freedom and Human Rights, chaired by Dr. Zafra M. Lerman, provided the impetus for the project. In 2002, the subcommittee brought the idea for a conference on chemistry in the Middle East to the ACS's International Activities Committee and, subsequently, to the ACS Board of Directors, chaired by Dr. Nina I. McClelland. In the end, the conference was organized by ACS's International Activities Committee and co-sponsored by the Royal Society of Chemistry (RSC) and IUPAC.

Wanting to also attract the attention of national governments, the organizing committee invited some of the best chemical scientists from the region along with six Nobel Laureates: Dr. Claude Cohen-Tannoudji spoke on "Cooling Atoms with Light: A Recent Application of Molecular Physics"; Dr. Dudley Herschbach's lecture on chemical education and research was entitled "The Impossible Takes a Little Longer"; Dr. Roald Hoffmann discussed "Protochemistries for Antiquity—Teaching Tools for Today"; Dr. Yuan T. Lee spoke on "Dynamics of Chemical Reactions and Photochemical Processes"; Dr. Jean-Marie Lehn discussed "From Molecular to Supramolecular Chemistry—Chemistry Beyond the Molecule"; and Dr. Rudolph A. Marcus lectured on "Unusual Isotope Effects in the Upper and Lower Atmosphere."

The organizers structured the conference to allow plenty of time for informal discussions among the participants. Each morning and afternoon session began with a lecture by a Nobel Laureate, followed by a discussion session and a special follow-up lecture or a working group meeting. The working groups, which had open, rotating memberships, discussed applications of chemical sciences in the Middle East. Working group meetings were scheduled so that each attendee had an opportunity to participate in every group. Each working group developed a set of recommendations that were presented in a plenary working session at the end of the conference.

Many of the conferees were members or presidents of their national academies of science and/or their

Conferees at dinner, Ann Nalley, Sultan Abu-Orabi, Afsaneh Safavi, John Malin, Zafra Lerman, Hanan Malkawi, Boshra Awad, Isa Khubeis

national chemical societies. In many cases, participants were encouraged to attend by the ministers of science of their respective countries. One, Dr. Venice Gouda, is the former science minister of Egypt.

Conferees presented some 30 papers in a well-attended and stimulating poster session. Topics included "Photooxidation Process Using Sunlight and Environmentally Friendly Sensitizers to Control Egyptian Schistosomes" (M. H. Abdel Kader, Egypt); "Chemometrics and Environmental Pollutants" (Mehdi Jalali-Heravi, Iran); "The Environmental Protection of Water Resources Shared by Israeli and Palestinians" (K. H. Mancy, USA); "Chemistry Department Localities and Their Intake Capacities in Iranian State Universities" (H. Zohoor, Iran); and "Contacts to Molecule-Based Devices" (D. Cahen, Israel).

In addition, invited scientists gave special lectures. Dr. Herman Winick of Stanford University spoke on "The Impact of the SESAME Project on Science, Technology, and Society in the Middle East." Prof. Peter Atkins, of Oxford University and chair of the IUPAC Committee on Chemistry Education, discussed "Modern Trends in Chemical Education." Dr. Charles Kolb, president of Aerodyne Research, Inc., spoke on "Regional Air Quality and Climate Change: New Insights and Research Tools."

Professor Roald Hoffmann lectures on Chemistry of Antiquities

Recommendations and Outcomes

Although the conference was not a CHEMRAWN meeting, the CHEMical Research Applied to World Needs committee of IUPAC helped by obtaining a contribution from UNESCO on behalf of the project. As in CHEMRAWN conferences, the conference working groups served as Future Actions Committees by meeting to discuss recommendations in the following areas:

- Materials and Polymer Science (group leaders: Roald Hoffmann and Helmut Ringsdorf)
- Cultural Heritage and Preservation of Antiquities (Roald Hoffmann and Venice Gouda)
- Environment, Water, and Renewable Energy (Yuan T. Lee and Charles Kolb)
- Research and New Methodologies in Science Education (Dudley Herschbach and Peter Atkins)
- Medicinal and Natural Products (Jean-Marie Lehn and Ernest Eliel)
- Research and Technology Transfer for Economies in Transition (Rudolph Marcus and Roald Hoffmann)
- Use of the International Centre for Synchroton-light for Experimental Science and Applications in the Middle East (SESAME project, Herman Winick and Dincer Ulku)

Those committees produced a set of recommendations, which are slated for follow-up:

a. Establish a Web site for communication among conference participants, which will eventually include a database on instrumentation available in the Middle East and opportunities for training in the use of that instrumentation.
b. Future Actions groups will work together to encourage governments in the Middle East to develop collaborative research agreements among countries in the region.
c. Participants will engage private companies in becoming involved in scientific collaborations in the Middle East.
d. Funding agencies, governments and providers of journals should work together to make online publications available to scientists in the region.
e. Materials chemists are reminded that (1) solar cells, (2) catalysts and (3) membrane technologies are particularly relevant in the Middle East and should receive special attention.
f. Natural products chemists are encouraged to find useful opportunities in (1) screening of local natural products for bio-activity; (2) studies of tropical diseases; (3) combining natural products with polymers; (4) cosmetics; (5) nutrition; and (6) pesticides.
g. Chemists concerned with cultural heritage are urged to help with preservation of precious Middle Eastern artifacts by (1) encouraging the training of conservers; (2) linking preservation with economic benefits; (3) involving the European countries more; (4) fostering future events, such as an upcoming workshop in Jordan on this topic.
h. The Chemical Education group proposes to con-

struct a database in at least four Middle Eastern languages to (1) exchange innovative teaching ideas, (2) promulgate simple and interesting experiments that can be carried out with basic equipment; and (3) exchange personal contacts. The chemical education specialists recommend creation of a regional steering committee to organize regional educational workshops for teachers, students, and the media, and to develop a digital videodisk (DVD) to promote interest in chemistry studies in the region.

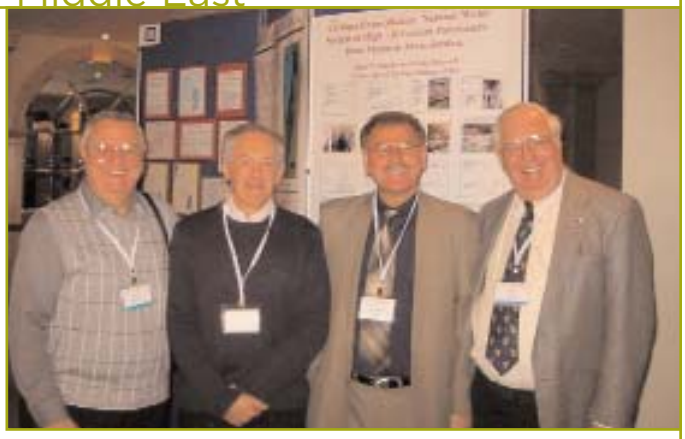
i. Environmental chemists in the Middle East are encouraged to concentrate on (1) developing the public's appreciation of how chemists work to improve the environment; (2) assembling environmental baseline data to share in the region; (3) finding improved uses of existing resources such as waste water, the area's cheapest source of water; (4) bringing scientists together to determine what baseline measurements must be made in the Middle East, and how to share data throughout the region; and (5) educating students in environmental chemistry.

j. The Economic Development working group encourages (1) fostering small businesses in the chemical economy; (2) using the "diaspora" of Middle Eastern heritage in developed countries to develop sources of venture capital; (3) encouraging governments to establish Small Business Innovative Research (SBIR) grant programs to encourage scientists with innovative ideas for new products and services; and (4) developing chemical business incubator programs at Middle Eastern universities.

k. Participants reviewed current progress in establishing the SESAME project in Jordan. They noted how important it is that national governments in the region be asked to provide support for SESAME. Dr. Yuan T. Lee offered three one-year fellowships for Middle Eastern scientists to receive advanced training through study at the synchrotron facility in Taiwan.

l. All participants recommended strongly that a second conference should be held in 2005.

At the culmination of the meeting, Dr. Zafra Lerman, chair of the Organizing Committee, stated "the results of the conference were spectacular," and "Conferees especially enjoyed the warm friendship shared among attending scientists from all countries.



Morton Hoffman, Peter Atkins, Sultan Abu-Orabi, and Paul Walter at the poster session.

Many participants stated that it was successful beyond any expectations."

Dr. Lerman added that the excellent relations among conferees are evidenced by the fact that participants have continued to interact after returning home and that joint research is being undertaken. After the conference, she noted, scientists from Israel and the Palestinian Authority met to discuss and plan scientific collaboration. For example, two of the conferees have submitted to an international granting agency a joint proposal to perform research on water quality.

Dr. Yitzhak Apeloig, president of Technion University (Israel Institute of Technology), has offered three scholarships for students from Middle Eastern countries to study at his university. As noted above, Professor Yuan T. Lee will provide three one-year fellowships for Middle Eastern scientists to perform research at the synchrotron light source in Taiwan. The scholarships will support advanced training to facilitate the work of young scientists at SESAME, the new synchrotron facility that is being constructed in Jordan with UNESCO support.

Malta proved to be an excellent choice for the conference, providing a safe venue that was easily accessible by scientists from all the countries represented. Organizers are very pleased with the outcome of the conference and truly believe that the conference made a genuine contribution toward improving scientific cooperation among chemical scientists in the Middle East region.

John M. Malin <J_malin@acs.org> is chairman of the CHEMRAWN Committee and assistant director of International Activities for the American Chemical Society.

www.iupac.org/projects/2002/2002-061-1-020.html

Chemical Society of Mauritius

A New Society Aims High for its Island Nation and the Indian Ocean Region

by Dhanjay Jhurry

Mauritius was dependent on agriculture and, in particular, on the sugar industry for many decades. In 1982, the country began a shift toward a more industrialized economy and placed major emphasis on developing the textile industry. Now, the government of Mauritius has decided that to keep pace with globalization, it is necessary to radically transform its economy from low-/medium-tech manufacturing to high-tech industries such as information and communications technologies, biotechnology, and pharmaceuticals. With this new focus on technology, the science literacy of the population will be a key element in the successful implementation of the government's policies.

The development of a high-tech sector in Mauritius makes it clear that science is everybody's business. Therefore, scientists have an obligation to explain the reality of science to society. Conscious of the important role of scientists, a group of chemists at the University of Mauritius founded a chemical society in June 2003, a first of its kind in Mauritius. The society was duly registered in Mauritius in October 2003. The society is a member of IUPAC as an Associate National Adhering Organization (ANAO) and is also affiliated with the Network of Users of Scientific Equipment of Southern Africa.

CSM President Dhanjay Jhurry with IUPAC Past-President Pieter Steyn.

Quick Facts About Mauritius

History

Of volcanic origin and sheltered for the most part by barriers of coral reefs forming natural, safe, crystal-clear lagoons, Mauritius has long been a dream destination. Known to Arabs as early as the 10th Century, but officially "discovered" in 1505 by the Portugese navigator Pedro Mascarenhas, the island was occupied successively by the Dutch (1598-1712), the French (1715-1810), and was ceded to Great Britain in 1814 through the Treaty of Paris. On March 12, 1968 Mauritius acceded to independence.

Geographical Location

Mauritius, which lies east of Madagascar, is situated approximately 2000 kilometers off the south-eastern coast of Africa. The land has an area of 1865-square kilometers with 330 kilometers of coastline. Inland features include a vast central plateau, subtropical forests, rivers, steams and waterfalls.

Population

At different stages in its history, people of diverse origins—Indian (Hindus and Muslims), African, European and Chinese—have settled on the island bringing their culture, language, values, and traditions. The country today is a recognized cultural melting pot and example of peaceful co-existance of the main religions of the world. The current population estimate is 1 200 000.

Source: <www.mauritius.net/quickfacts/introduction_main.htm>

The Chemical Society's official launching ceremony was held on 23 January 2004 in the presence of distinguished local and overseas guests, including IUPAC Past-President Pieter Steyn. A number of persons both from academia and industry were offered honorary membership on the occasion. They were selected by virtue of their contributions to the development of chemistry and science in Mauritius.

The support of IUPAC has given a boost to the society at the national and international levels. As Professor Steyn stated at the event, "the Chemical Society of Mauritius is like a newborn baby that should be nurtured to help it grow strongly and healthily."

The purpose of the Chemical Society, which comprises chemists from all sectors, is to promote chem-

istry—in its broadest definition—within the Mauritian community. The society also aims to be a link between university research and the Mauritian chemical industry. In addition, the society also hopes to promote the sciences in general by making the public conscious of the power and value of scientific ideas.

Now that the society is an ANAO of IUPAC, it intends to join hands with the international chemistry community and help with IUPAC's diverse projects and engage in new programs. The society hopes that a larger number of local researchers now will be able to attend international chemistry conferences because of reduced registration fees and possibly with support from IUPAC. It should be noted that Mauritian chemists are bilingual in French and English, a useful attribute for certain projects.

Chemists and all those involved with the chemical profession (from education to industry, including textiles and pharmaceuticals) and university students are invited to join the society to contribute to its development and to the advancement of chemistry. Membership is not restricted to Mauritians. The society aims, in particular, to attract colleagues from the Indian Ocean region—La Réunion, Madagascar, Seychelles, and Comoros. It also plans to set up a database of chemists in the region.

There are various types of membership (full, associate, student) and the membership fees vary from Rs 300 to Rs 900 (about USD 10 to 30). To date, the society has about 75 members and looks forward to doubling that number in a few months as more and more people come to know about its existence.

The society plan a number of activities throughout the year targeting students, teachers, people from industry, and the public at large. These will include roundtables, films, lectures by renowned chemists, short courses to meet industry's needs, and organization of brainstorming sessions on topical issues.

Chemistry is a fascinating subject. It is by and large a creative process. Yet, very often students at the secondary level find it dull and at times too difficult. New teaching techniques have been and are being developed to address the problem. One of them is DIDAC, a joint effort of Agfa-Gevaert and the Belgian Academy of Sciences, which addresses the problem of visualization in chemistry. We would like secondary school teachers and students in Mauritius to benefit from these new techniques.

A major activity during 2004 will be the organization of a poster competition similar to the "It's a Chemical World" contest organized by IUPAC and Science Across the World. The society has noted with concern that the Mauritian education system has led, over the years, to a cultural divide. Our idea is to impel those studying chemistry and the sciences, as well as students in the arts and the classics, to reflect on chemistry and to translate their feelings and observations into paintings.

IUPAC Past-President Pieter Steyn addressing the audience at the launching ceremony. Sitting from left to right: D. Jhurry (CSM president), Prof G. Mohamedbhai (vice chancellor, University of Mauritius), Dr. A. Suddhoo (executive director, Mauritius Research Council), and Mrs. C. Dupont (director, Curriculum, representing the Minister of Education & Scientific Research).

Another very important activity will be a UNESCO School and IUPAC Conference on Biopolymers and Oriented Polymer Synthesis to be held in Mauritius in July 2005. It is hoped that a number of young scientists and graduate students from all over the world, and particularly from the African region, will attend.

It is an undeniable fact that societies have played a major role in the advancement of science all over the world. The Chemical Society of Mauritius hopes to play a major role as well.

Dhanjay Jhurry <djhurry@uom.ac.mu> is president of the Chemical Society of Mauritius.

Go online for full text and references.

Back in 1972, the idea of collecting and evaluating solubility data emerged from a commission of the IUPAC Analytical Chemistry Division. The planning, coordination, implementation, and realization of the project took many turns over the years, but the project always survived and as of today it has bloomed into 79 volumes spanning more than 25 000 pages. As an early player in this endeavor, and author of three of the first four volumes in the series, Larry Clever has now prepared a historical review of the project, including appendixes listing all the meetings of the group, all events and key records of the International Symposia of Solubility Phenomena, all members of the Commission V.8 from its inception in 1979 until 1999, and complete detailed references of the 79 published volumes of the Solubility Data Series. *The excerpts below are extracted from the original review, which is available online at <www.iupac.org/publications/ci/2004/2603/4_clever.html>.*

The IUPAC Solubility Data Project: A Brief History

by Larry Clever

All scientists have a need to refer to handbooks. Some find their needs met by one comprehensive handbook, others may need to refer to many. Some handbook tables give evaluations and there is normally little question about their reliability. Other tables present an experimental quantity such as atomic mass, melting point, boiling point, vapor pressure, or solubility, and in these tables the reliability and the source of the numbers is often not addressed.

The problem with many handbooks is that often only one value is given, usually without error limits, without literature citation, and without mention of other data that were not used. And most handbooks make little or no effort to provide a complete literature survey or to evaluate in a systematic way the data they present.

Although some people may have wished for a handbook that presented *all* available experimental data on a given property, an *evaluation* of these data, and, where possible, a table of tentative or recommended data, such a handbook was never available. To do so is time-consuming and financially unrewarding. However, for more than 25 years the Solubility Data Project has been successfully pursuing this elusive goal.

Project Organization

In 1972, A. Stevan Kertes (The Hebrew University, Israel), proposed that the IUPAC Commission V.6, Equilibrium Data, of which he was a member, start a project on collecting and evaluating solubility data. Publications were envisaged in which all reliable data would be presented as they appeared in the original literature. In addition, experts would evaluate the data and, where appropriate, tables, figures, or fitted equations of tentative or recommended data would be prepared and presented for the use of the scientific community. Fortunately, the idea had the strong support of Commission V.6 Chair George Nancollas (SUNY Buffalo, USA) and of the IUPAC Executive Secretary Maurice (Mo) Williams. Without their support, the presence of strong opposition meant that the idea would have likely gone no further.

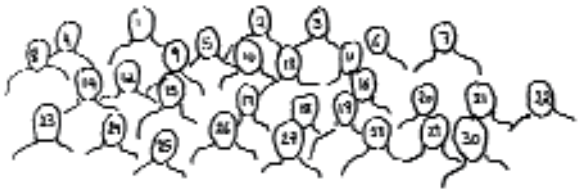
In 1973, a working party—appointed by the commission to consider further the idea of a solubility data project—authorized Kertes to set up a group independent of Commission V.6. In the fall of 1974, a group of recognized experts in the field of solubility was invited to meet with Kertes at McGill University in Montreal, Canada for what was the first Solubility Data Project meeting. (The complete attendance list can be found in the online version of this article.)

. . . most handbooks make little or no effort . . . to evaluate in a systematic way the data they present.

The following issues, first discussed in Montreal, were to come up at almost every Solubility Data Project meeting:

- guidelines for data sheets and evaluations
- evaluation methods and the preparation of useful evaluations
- recruitment of compilers, evaluators, and editors
- computers, databases, and electronic publication

At the meeting, a tentative format for collecting and evaluating solubility data was decided upon. Several attendees took on the task of preparing sample compilations and the evaluation of a single system in their areas of expertise. It was also decided that detailed guidelines for the compilation and evaluation of data should be developed.



Participants at the Workshop on Solubility Phenomena: Applications for Environmental Improvement, organized during the 10th ISSP Varna, Bulgaria, in July 2002 (see diagram): 1. Jack Lorimer (CDN), 2. Earle Waghorne (IRL), 3. Kiyoshi Sawada (J), 4. Reginald Tomkins (USA), 5. Jim Sangster (CDN), 6. Alan Mather (CDN), 7. Mark Salomon (USA), 8. Andrzej Maczynski (PL), 9. David Shaw (USA), 10. Dana Knox (USA), 11. Valerii Sazonov (RUS), 12. Jan Vanderdeelen (B), 13. Cezary Guminski (PL), 14. Ryo Miyamoto, 15. Roger Cohen-Adad (F), 16. Justin Salminen (FIN), 17. Pirketta Scharlin (FIN), 18. Clara Magalhaes (P), 19. Hitoshi Ohtaki (J), 20. Vesselina Platikanova (BG), 21. Stefka Tepavitcharova (BG), 22. Adam Skrzecz (PL), 23. Christo Balarew (BG), 24. Wolfgang Voigt (D), 25. Marie-Therese Cohen-Adad (F), 26. Heinz Gamsjäger (A), 27. Jitka Eysseltova (CZ), 28. Ken Marsh (NZ), 29. Hiroshi Miyamoto (J), 30. Vladimir Valyashko (RUS)

The IUPAC General Assembly met in Madrid, Spain in 1975. Commission V.6 invited observers interested in the solubility project to attend. Larry Clever, Colin Young, and Alan Clifford accepted the invitation and attended the meeting. Plans for the project moved ahead quite rapidly. The Solubility Data Project was made a Subcommittee of Commission V.6. Finally, in 1979 at the IUPAC General Assembly in Davos, Switzerland, the Solubility Data Subcommittee became a full commission (Commission V.8 of the Analytical Chemistry Division).

In 1999, at the Berlin General Assembly of IUPAC, an extensive reorganization was approved, under which all commissions (with a very few exceptions) were to be replaced by 2001 with working groups for specific projects under the direct control of the appropriate divisions. The plan for the Solubility Data Project was to combine the work of the Solubility Data and Equilibrium Data Commissions into a new subcommittee of the Analytical Chemistry Division called the Subcommittee on Solubility and Equilibrium Data. Thus, the Solubility Data Project has come full circle from subcommittee through commission and back again, albeit with very different terms of reference and very different experience.

The mission of the Subcommittee on Solubility and Equilibrium Data (SSED) is to coordinate projects in the area of compilation and critical evaluation of published experimental data on the chemical solubility of well-defined substances and other equilibrium systems. The SSED also coordinates the dissemination of evaluated solubility data through traditional (journal) and electronic (Internet-accessible database) means. The SSED works with the Analytical Chemistry Division and the U.S. National Institute of Standards and Technology (NIST, the Solubility Data Series publisher) in the selection of chemical systems for treatment, encourages the formation of Task Groups to perform compilation and evaluation, and assists Task Groups in carrying out their projects.

The initial membership of the SSED consists of H. Gamsjäger (Austria) as chair, P. May (Australia), M. Salomon (USA), P. Scharlin (Finland), D. Shaw (USA), S. Sjöberg (Sweden), and W. Voigt (Germany).

Publication

In 1978 a contract for the publication of the solubility data volumes was formalized between IUPAC and Pergamon Press. Stevan Kertes insisted on several points in the agreement, which set precedents. First, the agreement called for a page fee to be paid to each compiler and evaluator and for a page-typing fee to be paid to each volume editor. Previously, IUPAC project participants received no payment because it was assumed sufficient that the project was part of their research and enhanced their reputation. Second, these page fees would change in proportion to the UK cost-of-living price index.

Pergamon published the first 53 volumes of the

Solubility Data Series between 1979 and 1992. Due to some disagreements over the price of the volumes and publicity, the commission cancelled the publication agreement with Pergamon at the end of 1988. However, IUPAC and Pergamon agreed on a revised contract (negotiated by Jack Lorimer and Mo Williams) in 1989 that provided even better terms for compilers and evaluators. In 1992, two years after Pergamon Press had been sold to Elsevier Publishing Co., Elsevier decided to drop the series.

Between 1994 and 1996, Oxford University Press (under a contract also negotiated by Lorimer and Williams), published volumes 54 through 65, until that publisher decided to cancel the contract. The *Solubility Data Series* did not have a publisher between 1997–1998. In 1998, Mark Salomon and David Shaw helped forge an agreement between IUPAC and NIST (National Institute of Standards and Technology) that called for publication of the *Solubility Data Series* for at least four years as a part of the *Journal of Physical and Chemical Reference Data*, whereupon the series became known as the *IUPAC-NIST Solubility Data Series*.

Recruitment

For such an extensive and lengthy project it was necessary to recruit experts in many areas of both theory and practice of solubility. The list of participants in the project is rather difficult to estimate accurately, but certainly has well exceeded 100. Along with Stevan Kertes, Larry Clever and Mark Salomon were very successful in attracting capable people to take part in the project.

One difficult problem with recruitment in the 1980s was to involve the large number of scientists in the then-USSR in the project. Exploratory visits to the USSR under IUPAC auspices were made by Stevan Kertes and by C. Kalidas (India), with promising results. An unexpected problem arose. The copyright agency of the USSR, VAAP, insisted that any payments to contributors from the USSR should be made through and by them. A strong stand by Mo Williams and Jack Lorimer, with negotiations carried out by IUPAC Secretary General Tom S. West, succeeded in retaining IUPAC's right to make payments directly to contributors.

Committee Leadership

Stevan Kertes took on the responsibilities of both chair of the Solubility Data Commission and editor in chief of the IUPAC *Solubility Data Series* until 1987. Kertes continued as editor in chief, and Jack Lorimer became chair in 1987. Unfortunately, Kertes died suddenly in July 1988, a great blow to the project. Fortunately, Lorimer quickly and firmly took control and worked to see the project move ahead. As both editor in chief and chair of Commission V.8, he developed needed systems and brought order to the production of the Solubility Data Project volumes.

In 1996 Mark Salomon, U.S. Army Electronics Command, (USA) became editor in chief. Early on he negotiated an agreement with NIST and the *Journal of Physical and Chemical Reference Data* to publish the series. In 1992 the chairperson and editor in chief positions were divided, with Jack Lorimer continuing as editor in chief and Mark Salomon as the chair. In 1996 David Shaw, University of Alaska, (USA), became chair and Mark Salomon editor in chief.

Stevan Kertes acted as secretary of the Solubility Data Project from the beginning until 1979 when L. H. Gevantman, Office of Standard Reference Data, NBS (now NIST), was elected to the position. Gevantman served the project well with good advice and attention to detail, and set a good example for the commission secretaries who were to follow: R.P.T. Tomkins, New Jersey Institute of Technology (USA), and H. Gamsjäger, Montanuniversität Leoben (Austria), both of whom have done outstanding work.

Subcommittees

From the first meeting, the Solubility Data Project was organized into three subcommittees with responsibility for ensuring that the volumes were prepared, properly edited, and reviewed before publication. Upon attaining commission status these subcommittees were designated as follows:

- V.8.1 Gases in Liquids. Chair H. L. Clever (USA), 1976–1992; P. G. T. Fogg (UK) 1992–2000; Pirketta Scharlin (Finland), 2000-2001
- V.8.2 Liquids with Liquids. Chair A. F. M. Barton (Australia), 1976–1984; F. W. Getzen (USA), 1984–1998; A. Skrzecz (Poland), 1998–2001
- V.8.3 Solids in Liquids. Chair Mark Salomon (USA), 1976–1992; M.-Th. Saugier-Cohen Adad (France); 1992–2000; W. Voigt (Germany), 2000–2001

In addition to the subcommittees, Colin Young acted as a committee of one to prepare and edit the three cumulative indexes of the volumes (Volumes 19, 39 and 53) for the 53 volumes published by Pergamon

Press. No index volumes have yet been prepared for the 12 volumes published by Oxford University Press and the volumes published by NIST.

The author thanks Rubin Battino, Heinz Gamsjäger, David Shaw, and Mark Salomon and others who have read and commented on the manuscript. He has special thanks for Jack Lorimer who has carefully read the manuscript several times and made many valuable suggestions.

Editor's Note: Due to space constraints, this abbreviated article omits a number of sections. However, the following sections are included in the online version: Organization of the Printed Volumes, Guidelines, Databases and Electronic Publishing, International Symposium on Solubility Phenomena, Solubility Data Center, A Book on the Experimental Determination of Solubilities, the Franzosini Award, References, and Appendixes.

Professor H. Lawrence Clever <hclever@att.net> retired in 1992 from the Department of Chemistry at Emory University, Atlanta, Georgia, USA, but he is still active and is preparing volume 80.

www.iupac.org/divisions/V/502

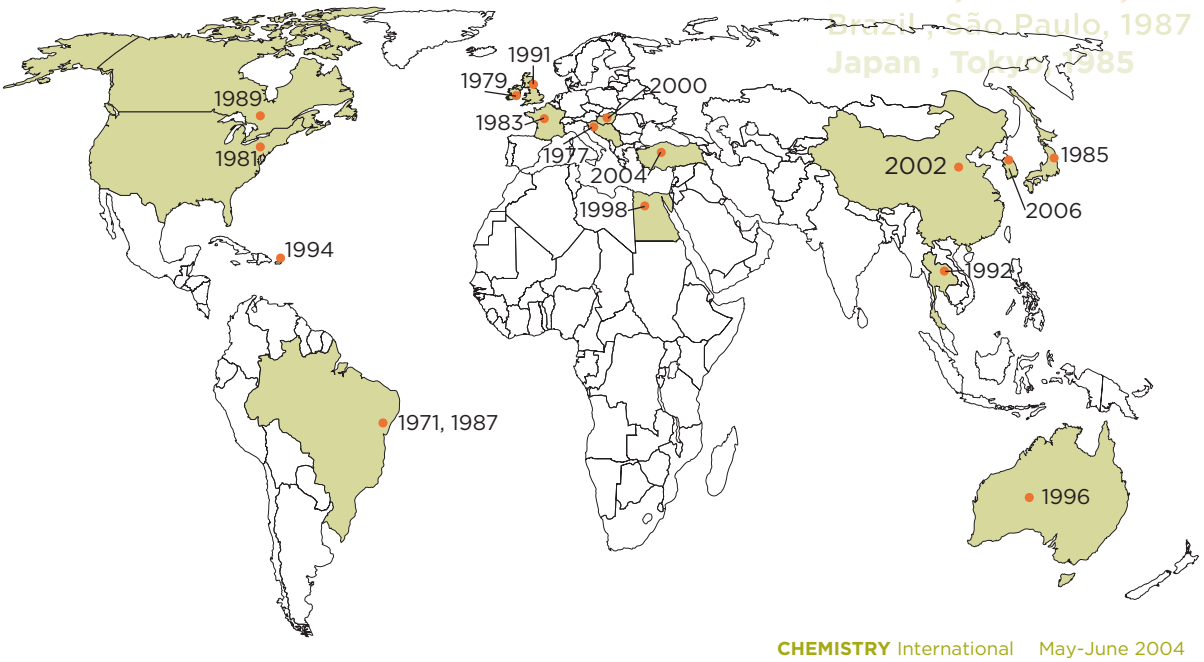
A description of the latest volume of the *Solubility Data Series*, volume 79, appears on page 30.

The CCE Seeks Expressions of Interest in Hosting the International Conference on Chemical Education

The International Conference on Chemical Education is a biennial event planned by the IUPAC Committee on Chemistry Education (CCE). The 18th conference in the series will be held 3-8 August, 2004, in Istanbul, Turkey. In 2006, the event will be held in Korea. CCE plans to identify possible hosts for the 2008 venue by the time of the conference in Istanbul. The CCE will make a final decision on the location at IUPAC's General Assembly in Beijing in 2005.

A letter expressing interest should be sent to Peter Atkins, CCE chairman, by 15 July 2004; e-mail <peter.atkins@lincoln.ox.ac.uk>.

Korea, Seoul, 2006
Turkey, Istanbul, 2004
China, Beijing, 2002
Hungary, Budapest, 2000
Egypt, Cairo, 1998
Australia, Brisbane, 1996
Puerto Rico, San Juan, 1994
Thailand, Bangkok, 1992
England , York, 1991
Canada , Waterloo, 1989
Brazil, São Paulo, 1987
Japan , Tokyo, 1985



2004 Thieme–IUPAC Prize in Synthetic Organic Chemistry

John F. Hartwig will be awarded the 2004 Thieme–IUPAC Prize in recognition of his outstanding achievements in the field of synthetic organic chemistry. Hartwig's independent research program is focused on the discovery, development, and understanding of new reactions catalyzed by transition metals. The scope of his research is extensive and he has created practical, catalytic synthetic methods that have a direct and relevant impact on synthetic chemists in many fields worldwide. Such goals have been achieved by obtaining insight from detailed mechanistic studies. He will be awarded the prize at the Award Lecture on 3 August 2004 at ICOS -15 in Nagoya, Japan.

The Thieme–IUPAC Prize, consisting of 5000 Euros, is awarded every two years on the occasion of IUPAC's International Conference on Organic Synthesis to a scientist under 40 years of age, whose research has had a major impact on the field of synthetic organic chemistry. The prize is sponsored jointly by Georg Thieme Verlag, IUPAC, and the editors of *Synthesis*, *Synlett*, *Science of Synthesis*, and *Houben-Weyl*.

John F. Hartwig was born in 1964 in Illinois, and raised in upstate New York. He obtained his B.A. in 1986 from Princeton University and then went on to complete his Ph.D. in 1990 under the collaborative direction of Robert Bergman and Richard Andersen at the University of California, Berkeley. Following a postdoctoral fellowship for the American Cancer Society with Stephen Lippard at the Massachusetts Institute of Technology, he joined the faculty at Yale University in 1992, where he is now professor of chemistry.

John F. Hartwig, 2004 Thieme-IUPAC Prize winner

Hartwig was co-developer of the palladium-catalyzed amination of aryl halides, the resulting aryl amines being ubiquitous among pharmaceutically relevant compounds. This chemistry is now used on a daily basis by medicinal and agrochemical chemists. His expertise in palladium chemistry has been extended to the catalytic α-arylation of carbonyl compounds. The development of this chemistry has allowed synthetic chemists to expand the repertoire of traditional enolate/electrophile pairs to include aryl halides, which do not couple with enolates in the absence of a catalyst. These α-arylations can be used to generate a number of biologically active compounds, including ibuprofen, naproxen, and tamoxifen.

www.iupac.org/news/archives/2004/thieme_prize.html

Strong Science and Technology Capacity–A Necessity for Every Nation

All nations, whether industrialized or developing, face a broad array of challenges that will require the application of up-to-date scientific knowledge and technology. Such challenges include mitigating environmental problems, safely adopting beneficial new technologies, and quickly responding to sudden outbreaks of new diseases. No nation can now afford to be without access to a credible, independent science and technology (S&T) research capacity that can help it to develop informed policies and take effective action in these and other areas, says a new report by the InterAcademy Council (IAC), an organization in Amsterdam created by 90 of the world's science academies.

The report, *Inventing a Better Future: A Strategy for Building Worldwide Capacities in Science and Technology*, was presented to U.N. Secretary-General Kofi Annan in February 2004. The IAC study panel that drafted the report included experts from 11 different nations and was co-chaired by Jacob Palis, of Instituto Nacional de Matematica Pura e Aplicada, Rio de Janeiro, Brazil, and Ismail Serageldin, director, Bibliotheca Alexandrina, Alexandria, Egypt.

"Inventing a Better Future delivers on the commitment that member academies have made to apply sound scientific knowledge and evidence-based principles to the critical issues that affect all nations: poverty, hunger, disease, the effects of globalization, and economic transformation," said Bruce Alberts, IAC co-chair and president of the U.S. National Academy of Sciences.

Enhancing local S&T capacity is essential, the report states, because trends in the development and use of new technologies have left a growing gap between "have" and "have not" nations. The world is experienc-

ing a vicious cycle in which developing countries that lag in S&T capacity fall further behind, as industrialized nations with financial resources and a trained scientific work force exploit new knowledge and technologies more quickly and intensively.

These deficits can leave entire developing economies behind. And when nations need to respond to diseases such as HIV or SARS, or make decisions about issues such as stem-cell research or genetically modified foods, this lack of S&T infrastructure can breed unfounded fear and social discord.

The report asserts that there is no reason why, in an era in which air travel and the Internet already tightly interconnect national economies, S&T capacity building should not be a worldwide priority. Developing countries must begin strengthening their national capacities. "Given the current rate of change in science and technology, there is no time to waste if the majority of humanity is not to suffer further marginalization," the report concludes.

www.interacademycouncil.net

New Best Estimates of the Values of the Fundamental Constants

by Ian Mills

The so-called fundamental constants of nature have an increasing importance in science today. Fundamental constants refer to the Planck constant *h*, the Boltzmann constant k_B, the elementary charge *e*, and a number of others listed on the next page. These quantities play a key role in most of the basic relations involved in modern physics and chemistry, and they provide the ultimate standard of reference for all quantitative measurements. For these reasons, the scientists strive to determine the values of these constants with ever greater accuracy in terms of the base units of our system of measurement, such as the kilogram, metre, second, ampere, and kelvin—the base units of the SI, the International System of units. The Consultative Committee for Units (of the International Committee on Weights and Measures, BIPM/CCU) advises the Comité International des Poids et Mesures on defining (or redefining) each of the base units of the SI in terms of the fundamental constants rather than in terms of material artefacts or time intervals related to the rotation of the earth. Today, some, but not all, of the base units of the SI are defined in this way, and we are working on the remainder.

In December 2003, new best estimates of the fundamental constants were released. These are compiled and published with the authority of a CODATA committee that exists for this purpose, but in practice they are produced (on this occasion) by Barry Taylor and Peter Mohr at the U.S. National Institute for Standards and Technology (NIST), in Gaithersburg, MD. These new values displace the 1998 values (also produced by Mohr and Taylor), which have been in use for the last four years. The 1998 values in their turn displaced the 1986 best estimates (which were produced by Cohen and Taylor), which were in use for the 12 years from 1986 to 1998.

As the years go by, scientists determine these constants with ever-greater accuracy. The uncertainties associated with the best estimates of the fundamental constants have mostly been falling by roughly an order of magnitude each 10 years, as new and improved experimental measurements make it possible to determine the constants with ever greater precision. The table on page 18 contains the most interesting constants for chemistry from the new 2002 best estimates, comparing the 1986, 1998, and 2002 values. The complete list is available from the NIST Web site, <http://physics.nist.gov/constants>, and will be published in an archive journal early in 2004.

Determining a set of best estimates of this kind is not simple, because there are numerous theoretical equations relating the constants and there are many different experiments that provide information on one or another of the constants. Thus, they all have to be determined from a single giant least-squares calculation, using all the available data with their uncertainties and all the known theoretical relations. This is why they are only revised at wide intervals. However, Barry Taylor says that they hope to revise them at more fre-

quent intervals from now on, perhaps every three or four years. There is also a table of correlation coefficients among the various values on the NIST Web site.

Note that a few of these constants are exact (have zero uncertainty), because of the way that the units are defined. Thus, the metre is now defined in such a way as to make the speed of light c_0 exact, and the ampere is defined in such a way as to make the magnetic constant μ_0 (the permeability of free space) exact. The relation $\varepsilon_0\mu_0 = 1/c_0^2$ then implies that the electric constant ε_0 (the permittivity of free space) is also exact.

As an example of the relations that we believe to hold between the constants, the Boltzmann constant, k, the gas constant, R, and the Avogadro constant, N_A, are related by the equation: $R = N_A\ k$. Although these three constants might be independently determined by different methods, there would be no sense in adopting values that did not fit this relation.

A more complicated relation is that between the Planck constant, h, and the Avogadro constant, N_A:

$$h = \frac{c_0\, A_r(e)\, M_u\, \alpha^2}{2\, R_\infty\, N_A}$$

where c_0 is the speed of light in vacuum, $A_r(e)$ is the relative electron mass (on the atomic mass scale, referred to $m(12C)/12$), M_u is equal to 1 g/mol (the standard molar mass), α is the fine structure constant, and R_∞ is the Rydberg constant. Because the best measurements of the Avogadro constant and the Planck have a relative standard uncertainty of about 10^{-7}, whereas all the other constants in this relation are either exact or are known to about 10^{-9}, we require the best estimates of h and N_A to satisfy this relation within their mutual uncertainties. Unfortunately recent measurements of the value of h (from Watt balance experiments) and N_A (from the X-ray crystal density experiment) are not quite consistent within the uncertainty budget estimated for each value, and this has led to an *increase* in the uncertainty of these two constants since the 1998 appraisal (which is exceptional!). There is then a

Fundamental Constants 2002

Quantity	*Symbol*	*2002 Value (standard uncertainty)**	*Unit*	*Relative standard uncertainty* u_r
speed of light in vacuum	c_0	299 792 458	m s^{-1}	(exact)
magnetic constant	μ_0	$4\pi \times 10^{-7}$	H m^{-1}	(exact)
electric constant	$\varepsilon_0 = 1/\mu_0 c_0^2$	8.854 187 817 …	$\times 10^{-12}$ F m^{-1}	(exact)
Planck constant	h	6.626 069 3 (11)	$\times 10^{-34}$ J s	1.7×10^{-7}
elementary charge (charge on a proton)	e	1.602 176 53 (14)	$\times 10^{-19}$ C	8.5×10^{-8}
electron rest mass	m_e	9.109 382 6 (16)	$\times 10^{-31}$ kg	1.7×10^{-7}
proton rest mass	m_p	1.672 621 71 (29)	$\times 10^{-27}$ kg	1.7×10^{-7}
atomic mass constant (dalton, or unified atomic mass unit, $m(^{12}C)/12$)	m_u = Da = u	1.660 538 86 (28)	$\times 10^{-27}$ kg	1.7×10^{-7}
Avogadro constant	L, N_A	6.022 141 5 (10)	$\times 10^{23}$ mol^{-1}	1.7×10^{-7}
Boltzmann constant	k, (k_B)	1.380 650 5 (24)	$\times 10^{-23}$ J K^{-1}	1.8×10^{-6}
Faraday constant	F	96 485.33 83 (83)	C mol^{-1}	8.6×10^{-8}
gas constant	R	8.314 472 (15)	J mol^{-1} K^{-1}	1.7×10^{-6}
fine structure constant	α	7.297 352 568 (24)	$\times 10^{-3}$	3.3×10^{-9}
Bohr radius	a_0	0.529 177 210 8 (18)	$\times 10^{-10}$ m	3.3×10^{-9}
Hartree energy	E_h	4.359 744 17 (75)	$\times 10^{-18}$ J	1.7×10^{-7}
Rydberg constant	R_∞	10 973 731.568 525 (73)	m^{-1}	6.6×10^{-12}
Bohr magneton	μ_B	9.274 009 49 (80)	$\times 10^{-24}$ J T^{-1}	8.6×10^{-8}
Landé g factor for free electron	g	2.002 319 304 371 8 (75)		3.8×10^{-12}
nuclear magneton	μ_N	5.050 783 43 (43)	$\times 10^{-27}$ J T^{-1}	8.6×10^{-8}
Relative atomic mass of the electron	A_r(e)	5.485 799 094 5 (24)	$\times 10^{-4}$	4.4×10^{-10}
Newtonian constant of gravitation	G	6.674 2 (10)	$\times 10^{-11}$ m^3 kg^{-1} s^{-2}	1.5×10^{-4}

*The standard uncertainty given in parenthesis (i.e. the estimated standard deviation of the value quoted), applies to the least significant digits of each constant.

Source: The National Institute of Standards and Technology (NIST) Reference on Constants, Units, and Uncertainties Web page <http://physics.nist.gov/ccu/constants>.

consequent increase in the estimated uncertainties of several other constants.

These constants are described as the 2002 best estimates, although the values have only just been released in December 2003, because the cut-off date for data included in the analysis was 31 December 2002.

References

The NIST Web site: http://physics.nist.gov/constants

Mohr and Taylor, *J. Phys. Chem. Ref. Data* **28**, pp 1715–1852 (1999); also in *Rev. Mod. Phys.* **72**, pp 351–495, No 2, April 2000 (which is essentially the same paper) ; these two papers describe the 1998 best estimates, but they contain a lot of useful information.

See also the *SI Brochure* 7th edition 1998, ed. Mills and Quinn, available from the BIPM Web site <www.bipm.org/en/publications/brochure>, for information on the definition of the SI base units. The brochure is also available as a printed book (ISBN 92-822-2154-7), which can be ordered from the BIPM Web site.

Ian M. Mills < i.m.mills@rdg.ac.uk> is professor of chemistry at the University of Reading; since 1996, he is the IUPAC representative on the International Committee on Weights and Measures/Consultative Committee on Units.

Comparison of 1986, 1998, and 2002 values

Quantity	*Symbol*	*1986 Value*	*1998 Value*	*2002 Value*	*Unit*
Planck constant	h	6.626 075 5 (40)	6.626 068 76 (52)	6.626 069 3 (11)	$\times 10^{-34}$ J s
elementary charge (charge on a proton)	e	1.602 177 33 (49)	1.602 176 462 (63)	1.602 176 53 (14)	$\times 10^{-19}$ C
electron rest mass	m_e	9.109 389 7 (54)	9.109 381 88 (72)	9.109 382 6 (16)	$\times 10^{-31}$ kg
proton rest mass	m_p	1.672 623 1 (10)	1.672 621 58 (13)	1.672 621 71 (29)	$\times 10^{-27}$ kg
atomic mass constant (dalton, or unified atomic mass unit, $m(^{12}C)/12$)	m_u = Da = u	1.660 540 2 (10)	1.660 538 73 (13)	1.660 538 86 (28)	$\times 10^{-27}$ kg
Avogadro constant	L, N_A	6.022 136 7 (36)	6.022 141 99 (47)	6.022 141 5 (10)	$\times 10^{23}$ mol^{-1}
Boltzmann constant	k, (k_B)	1.380 658 (12)	1.380 650 3 (24)	1.380 650 5 (24)	$\times 10^{-23}$ J K^{-1}
Faraday constant	F	9.648 530 9 (29)	9.648 534 15 (39)	9.648 533 83 (83)	$\times 10^{4}$ C mol^{-1}
gas constant	R	8.314 510 (70)	8.314 472 (15)	8.314 472 (15)	J mol^{-1} K^{-1}
fine structure constant	α	7.297 353 08 (33)	7.297 352 533 (27)	7.297 352 568 (24)	$\times 10^{-3}$
Bohr radius	a_0	0.529 177 249 (24)	0.529 177 208 3 (19)	0.529 177 210 8 (18)	$\times 10^{-10}$ m
Hartree energy	E_h	4.359 748 2 (26)	4.359 743 81 (34)	4.359 744 17 (75)	$\times 10^{-18}$ J
Rydberg constant	R_∞	10 973 731.534 (13)	10 973 731.568 548 (83)	10 973 731.568 525 (73)	m^{-1}
Bohr magneton	μ_B	9.274 015 4 (13)	9.274 008 99 (37)	9.274 009 49 (80)	$\times 10^{-24}$ J T^{-1}
Landé g factor for free electron	g	2.002 319 304 386 (20)	2.002 319 304 373 7 (82)	2.002 319 304 371 8 (75)	
nuclear magneton	μ_N	5.050 786 6 (17)	5.050 783 17 (20)	5.050 783 43 (43)	$\times 10^{-27}$ J T^{-1}
Newtonian constant of gravitation	G		6.673 (10)	6.674 2 (10)	$\times 10^{-11}$ m^3 kg^{-1} s^{-2}

The values are presented in a concise notation whereby the standard uncertainty is given in parenthesis next to the least significant digits to which it applies; for example, h = 6.626 069 3 (11) is the concise form of the expression h = 6.626 069 3 ± 0.000 001 1

This section of CI *provides a way for members and member organizations to share ideas and concerns. For this issue, the Japanese National Adhering Organization sent us, without prompting, the following report of activities of its National Committee for Chemistry. In publishing here a version of this report, we hope to echo the concerns of other organizations and facilitate consultation and dialogue, and the sharing of best practices.*

Chemistry in Japan—A Report from the National Committee for Chemistry

by Akio Yamamoto

The National Committee for Chemistry in Japan—a committee that belongs to the Science Council of Japan (SCJ), the NAO for IUPAC—comprises 61 members. The committee is charged with deliberating on "important matters related to chemistry and coordination of the research programs in and outside of Japan," and is therefore the link with IUPAC.

The committee members are selected based on recommendations from other chemistry-related societies. The committee, which has one of the largest memberships among other national committees of the Science Council of Japan, represents a broad cross section of the chemical community in Japan.

During the past several years, the committee has been involved in domestic and international efforts to promote chemistry. Between 2000 and 2003 the committee undertook a project to address problems facing the chemical community. After extensive discussions, the committee finalized the report and released it last year. Following is a summary of the report's recommendations.

Summary of the Report of the National Committee for Chemistry, The Science Council of Japan

The report's recommendations are divided into three parts directed to the government, the public, and fellow chemists.

Message to the Government

Among the issues the committee discussed, the following problems emerged as the most important.

- **Improvement of University Facilities is Urgently Needed—**Although we acknowledge the recent increase in research grants given to universities and other research institutions, we have to point out the unsatisfactory conditions of university buildings, particularly in chemistry-related departments. Space is often very limited, making laboratories dangerously congested. In order to meet international safety standards, it is urgent that these facilities be improved.
- **Support for Graduate Students Should be Improved—**A lack of support for Ph.D. students discourages many talented students from pursuing Ph.D. program. More scholarships, research assistantships, and teaching assistantships should be provided for these students.
- **Information Databases Should be Upgraded—**The present compilation of scientific and engineering data is unsatisfactory to allow the nation to make reasonable judgments regarding science policy. Information databases in universities should be improved to track the progress of science and engineering.

Message to the Public

- **The committee disagrees with current usage of the term "chemical substances" in the mass media.** The mass media often use the term "chemical substances" to refer to synthetic compounds, especially those that are poisonous or harmful. However, the term "chemical substances," when properly used, applies to any substance on earth; water, table salt, sugar, and air are all chemical substances. There are many natural substances that are quite poisonous and any seemingly safe substance can be harmful to the human body when taken in excess. Certainly there have been incidents in which chemicals were carelessly or inadvertently released to the environment and caused great harm. It is quite clear that chemists should make every endeavor to keep the environment unspoiled. However, we discourage incorrect usage of the term "chemical substances" because it creates an incorrect image of chemistry.
- **When discussing the risks involved with chemicals, the mass media should take into account the ratios of risk to benefit and of cost to benefit.** Nothing can be absolutely safe. Therefore, the committee requests that the mass media present a

balanced portrayal of the ratios of risk to benefit and of cost to the benefit when discussing chemical issues.
- **The contribution of chemistry to the improvement of human life should be properly recognized.** Chemistry has played an important role in improving human life and liberating us from various, previously incurable, diseases.

Message to Fellow Chemists and Chemical Engineers

- **Look Outside One's Own University—**The custom of hiring staff only from within is still prevalent in Japanese universities. A survey conducted by committee members revealed that in many chemistry-related departments this trend is still persistent, although there are signs of improvement. The committee recommends that students be advised to go to different universities when they pursue advanced degrees. In order to enhance the mobility of researchers, university staff should be hired with preference to those who have been trained in other institutions.
- **Industry Should Recognize the Value of Ph.D. Students—**In Japan, the chemical industry's recognition of the value of graduate students with Ph.D. degrees is still low. We urge the industry to provide proper recognition. At the same time, we urge university professors to put more effort into producing Ph.D. students with adequate training in graduate courses so that the value of degrees can be properly evaluated. The present system of giving Ph.D. to industry chemists based solely on the basis of their submitted theses should be reexamined.
- **A Coalition of Academic Societies Should be Encouraged—**There are 31 societies related to chemistry in Japan. There is therefore a great deal of redundant effort to make each society function properly. Many these societies are also having financial difficulties. It is time to call for coalition of these societies with future possible project of unification. The committee for chemistry of SCJ requests each chemistry-related society to take action.

Other Comments

In its report, the committee put forth a number of additional findings and recommendations:

- The present trend of chemistry-related departments adopting more fashionable names without the word "chemistry" may undermine the status of chemistry in society. We urge these departments to keep the word "chemistry" when restructuring.
- The subject of chemistry has been excessively curtailed in university entrance examinations to the detriment of universities and future generations.
- Better methods should be developed for encouraging cooperation between academia and industry.
- Japanese chemists should play a more active role in international organizations such as IUPAC and Asian chemical societies.
- The Chemical Society of Japan finally decided to send a delegation to the Chemistry Olympiad. We, the Committee for Chemistry in SCJ, support the decision and are prepared to extend our assistance in sending the delegation.
- A sustained effort should be undertaken to increase the percentage of women actively participating in education and research in academic institutions.
- The present custom in national universities of compulsory retirement at an early age causes the unnecessary loss of talent and experience. A system needs to be established in which capable elderly members of the chemical community can continue their research without blocking the promotion of younger scientists.

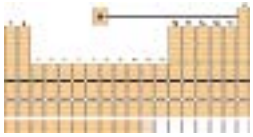
After release of the report, the committee members' terms ended. The new members of the committee, led by Chairman Hiizu Iwamura, are eager to help Japan and the Japanese chemical community resolve the issues outlined above.

Akio Yamamoto was chairman of the National Committee for Chemistry in Japan from 2001 to 2003.

The Placement of Hydrogen in the Periodic Table

by Eric Scerri

In a recent article (Nov-Dec 2003 *CI*, p. 14), Peter Atkins and Herb Kaesz proposed a modification to the periodic table concerning the placement of the element hydrogen. Contrary to its usual placement at the top of the alkali metals, and its occasional placement among the halogens, Atkins and Kaesz choose to position hydrogen on its own and floating above the table. In doing so these authors appear to over-



look the possibility of hydrogen's membership of the group that is usually headed by carbon as has recently been argued in detail.[1]

But rather than considering the relative virtues of these three possible placements, I intend to consider the argument for the removal of hydrogen from the main body of the table a little more closely and from the perspective of the philosophy of chemistry. A very widely held belief, among chemists and others alike, is that the periodic system consists primarily of a classification of the elements as simple substances that can be isolated and whose properties can be examined experimentally. However, there is a long-standing tradition of also regarding the elements as unobservable bearers of properties, sometimes termed elements as basic substances.

Surprising as it may seem, this notion has had a profound influence on the establishment and the survival of the periodic system since its discovery in the 1860s. For example, Mendeleev, arguably the leading discoverer of the periodic system, frequently stressed that he was primarily classifying the elements in the sense of abstract bearers of properties and not as simple substances. Whereas carbon occurs as graphite and diamond, if one focuses on the element in its simple substance forms, the entry for carbon in the periodic table refers to the element as the basic substance which underlies both allotropic forms.

Similarly, the discovery of isotopes in the early years of the twentieth century led to a crisis in which the known "atoms" appeared to have suddenly multiplied in number. Some chemists like Kasimir Fajans stated that the periodic table would not survive this discovery. However, the radio-chemist Fritz Paneth argued, like Mendeleev, that the periodic table should not primarily classify simple substances like the isotopes of the elements. He argued that it should classify the abstract elements and that the periodic table would survive the discovery of isotopes, which of course it has.[2]

Our current inability to place hydrogen in the periodic table in an unambiguous manner should not lead us to exclude it from the periodic law altogether, as Atkins and Kaesz seem to imply in removing hydrogen from the main body of the table. I suggest that hydrogen is as subject to the periodic law as all the other elements are. I also maintain that there is a "fact of the matter" as to the optimum placement of hydrogen in the main body of the table and that this is not a matter of utility or convention that can be legislated as these and other authors have argued.

Rather than relying on specific properties of the elements as simple substances, we should seek some form of underlying regularity in order to settle the question of the placement of hydrogen. One possibility is to begin each new period with a new value of n + λ (sum of first two quantum numbers) in the assignment of electronic configurations, as many authors have suggested.[3] Such a periodic table results in the placement of hydrogen in the alkali metals and helium among the alkaline earths. Of course the second of these placements raises further difficulties for those who insist on viewing the elements only as simple substances. But as I have tried to argue here this is a mistaken view of the nature of the chemical elements.

References

1. M. W. Cronyn, *J. Chem. Educ.*, 2003, **80**, 947–951.
2. E. R. Scerri, in *Minds and Molecules*, N. Bhushan, S. Rosenfeld (eds.), Oxford University Press, New York, 2000.
3. G. Katz, *The Chemical Educator*, 2001, **6**, 324–332.

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Other Comments

I support your suggestion for the new central position for hydrogen. It is a good and reasonable solution to the problems you discuss.

Brad Bovenzi <bbovenzi@mcquaid.org>, McQuaid High School, Rochester, New York, USA

To take away H from the head of the alkaline metals group and put it in the center is an excellent idea and should be adopted by IUPAC.

Alex von Zelewsky <Alexander.vonzelewsky@unifr.ch>, Department of Chemistry, University of Fribourg, Perolles, Fribourg, Switzerland

I do agree with you that an adaptation in which hydrogen is centered at the head of the periodic table has great merit. You have sound arguments for such a proposition.

Primo Šegedin <primoz.segedin@Uni-Lj.si>, Department of Chemistry and Chemical Technology, University of Ljubljana, Slovenia.

www.iupac.org/publications/ci/2003/2506/ud.html

The Project Place

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See also www.iupac.org/projects

Standard Definitions of Terms Related to Mass Spectrometry

In February, the Analytical Chemistry Division, supported by the Physical and Biophysical Chemistry Division, approved a project to update mass spectrometry terms and definitions. It has been more than 10 years since the chapter on mass spectrometry terms and definitions in the *IUPAC Compendium of Analytical Nomenclature* ("Orange Book") was last updated. Since that time, the field of mass spectrometry has seen an unprecedented growth both in use and in scope, culminating in the 2002 Nobel Prize in Chemistry, awarded in part for the development of mass spectrometry methods for the analysis of biomolecules. The introduction of new mass spectrometry instruments and techniques has led to an explosion in terminology, some of it redundant, conflicting, and often trademarked, that makes it difficult for the disparate practitioners in the field to communicate effectively.

Wide participation is needed to achieve consensus on mass spectrometry nomenclature. To facilitate discussion, a Web site <msterms.com> has been set up that has links to online versions of the current terminology and discussion forums for comments and suggestions. There will also be opportunities for face-to-face discussion.

The task group will have its initial meeting during a nomenclature workshop at the American Society for Mass Spectrometry meeting in Nashville in May 2004, and will convene at subsequent ASMS meetings in San Antonio, Texas, May 2005, and Seattle, Washington, May 2006. Members of the task group will participate in the American Chemical Society Meeting in San Diego, California, March 2005, the British Mass Spectrometry Society Meeting in York, September 2005, and the IUPAC Congress in Beijing, China, August 2005. A final draft of the revised list of terms and definitions will be presented at the International Mass Spectrometry Conference in Prague, Czech Republic, 2006.

For more information, contact the Task Group Chairman Kermit Murray <kkmurray@lsu.edu>.

www.iupac.org/projects/2003/2003-056-2-500.html

Terminology, Quantities, and Units Concerning Production and Applications of Radionuclides in Radiopharmaceutical and Radioanalytical Chemistry

The current editions of the IUPAC Orange and Gold Books do not adequately cover the definition of terms used in nuclear and radiochemistry, radioanalytical, and radiopharmaceutical chemistry, and related nuclear sciences and technologies. A detailed analysis of relevant textbooks, journals, and IUPAC recommendations, published in the last decades, has been carried out by a task group of the Analytical Chemistry Division. The task group has found that many terms and definitions should be clarified or modified and then disseminated through the scientific and industrial communities.

This new project will update and improve the terminology, quantities, and units concerning production and application of radionuclides in radiopharmaceutical and radioanalytical chemistry. The task group will pay particular attention to the critical discussion of several concepts (e.g., *carrier, specific activity, activity concentration, isotopic exchange*, and *speciation of carrier forms*) related to production of radionuclides and labeled chemical entities (i.e., radiopharmaceutical compounds).[1-3] The resulting document will also explain the relationships between these quantities and the applications of radioactivity in the life sciences, in bio- and nano-technologies, and radioanalytical techniques.[4,5]

High specific activity radionuclides and labelled compounds are of increasing relevance and demand in the field of radiodiagnostics by γ-scintigraphy, single-photon emission tomography (SPECT, SPET), and positron emission tomography (PET, i.e., more properly the detection of annihilation radiation of positron emitters). While the *molecular imaging* techniques, based on emission of γ photons of nuclear origin, do provide information on *in-vivo* biochemistry, pharmacokinetic, and metabolism of drugs and labeled chem-

ical entities, other complementary imaging techniques like computerized tomography (CT, CAT) and nuclear magnetic resonance (NMRi, MRi) provide mainly *morphological* data about the body compartment or organ under investigation. *Fusion imaging* techniques like PET/CT, SPET/CT and PET/MRi do increase further the performances of molecular imaging techniques and are of increasing use in medical departments, both for research and clinical purposes.

Another field of relevant interest to this task group is metabolic radiotherapy, immunoradiotherapy, targeted radiotherapy of tumors and degenerative pathologies, by compounds labelled with beta and Auger emitters, high-LET alpha emitters and short-lived *in-vivo* radionuclide generators.

The main aspects of terminology that will be discussed in the document are as follows:

- glossary of terms, quantities, units of radioactivity, and related quantities and their definitions in SI (and other *obsolete* systems of units)
- radionuclide production by ion accelerator, thermal/fast nuclear reactor, fast neutron generator
- radioanalytical and radiopharmaceutical chemistry laboratory techniques
- radioanalytical methods and nuclear analytical techniques and features
- labelling of chemical species, drugs, and radiopharmaceutical compounds
- quality control/assurance of radionuclides and labelled compounds
- interaction of radiation with matter; radiation protection and dosimetry, laboratory safety
- fields of application include radiodiagnostics by direct techniques; radiodiagnostics by fusion techniques; molecular imaging; metabolic radiotherapy with radiopharmaceutical compounds; immunoradiotherapy with beta, Auger, and alpha emitters; and targeted radiotherapy
- exhaustive and updated list of literature, nuclear databases, and international/national e-links

The project is of interest to other IUPAC Divisions: Physical and Biophysical, Inorganic, Organic and Biomolecular, Macromolecular, Analytical, Environmental, Human Health, Nomenclature, as well as CHEMRAWN, Chemistry and Industry, and Chemistry Education. Relations with IAEA, IUPAP, ISO, BIPM, ICRP, ICRU, EU-JRC, NIST, WHO and other relevant bodies are envisaged or already established.

The new document will be implemented using XML-based files, which can be easily analyzed without the use of customized software products and can be read by several text editors. The dissemination plan will consist of the following:

- review of the results of the project on the main journals devoted to nuclear, radioanalytical, and radiopharmaceutical chemistry
- presentation of the results at international conferences and workshops on nuclear chemistry, radioanalytical chemistry, radiopharmaceutical chemistry, and related technologies, as well as radiation and radionuclide metrology
- strong recommendation to the editors of scientific journals to adopt the updated nomenclature
- public information about the impact of nuclear related technologies on human health and quality of life (i.e., visibility of nuclear related sciences and technologies)

References

1. A.P. Wolf, T.J. Tewson, M.J. Welch, *J. Nucl. Med.*, **22** (1981): 392-393.
2. J.J.M. de Goeij, M.L. Bonardi, How do we define the concepts specific activity, radioactive concentration, carrier, carrier-free, no-carrier-added?, MARC-VI, April 2003, Kailua-Kona, USA; *J. Radioanal. Nucl. Chem.*, in press.
3. M.L. Bonardi, J.J.M. de Goeij, How do we ascertain specific activities in no-carrier-added radionuclide preparations?, ibidem, in press.
4. M.L.Bonardi, C. Birattari, F. Groppi, E. Sabbioni, *Appl. Radiat. Isot.*, **57** (2002): 617-635.
5. M.L. Bonardi, F. Groppi, H.S. Mainardi, *Microchem. J.*, **73** (2002): 153-166.

For more information, contact the Task Group Chairman Mauro L. Bonardi <mauro.bonardi@mi.infn.it>.

www.iupac.org/projects/2003/2003-015-2-500.html

Toward a Core Organic Chemistry Curriculum for Latin American Universities

In the fall of 2002, the Committee on Chemistry Education and the Organic and Biomolecular Chemistry Division began a joint pilot project to update organic chemistry curriculum for Latin

Participants at the mini-satellite symposium held 25 September 2003 in Florianópolis, Brazil.

American universities (see July-Aug 2003 *CI*, p. 23). A mini-satellite symposium on this project topic was organized 25 September 2003 at the 7th Latin American Conference on Physical Organic Chemistry (CLAFQO-7), which was held 21–26 September 2003 in Florianópolis, Brazil.

The symposium was opened by a brief report on the overall current state of the project, and then each member of the Latin American Task Group (LTG) presented the "state of the art" of the project at his/her university. Participants from other countries, still non-members of the LTG, were invited to briefly comment on the teaching of organic chemistry in their universities. The audience was also enriched by the attendance of several lecturers and participants from the CLAFQO-7, who made significant contributions during the discussions.

Although the presentations shared common themes, a wide spectrum of approaches was observed, and all participants emphasized the need for an updated core organic chemistry curriculum to facilitate communication, transferability of courses, and exchange of students. Some topics, considered essential by the task group, such as NMR and MS spectroscopy, conformational stereochemistry, and introduction to organic synthesis, are not taught in many universities. This is mostly because of difficulties in getting professors who are up to date in these topics. To remedy this situation, someone proposed the development of a sort of "Summer School" in which professors with expertise in the different subjects could offer training courses for other teachers.

At one point during the symposium, the results of the questionnaire that had been circulated during May–July 2003 among the universities of the region were presented and discussed. As a result of the discussion, it was proposed that an up-dated organic chemistry curriculum should be designed using this material. A proposal was then written and distributed among the members of the LTG in December 2003 to be tested in 2004. The proposal of a core organic chemistry curriculum includes 14 main topics to be developed in two semesters:

1. structures and properties
2. isomerism and stereochemistry
3. reaction mechanisms and intermediates
4. addition reactions
5. spectroscopy (UV, IR, NMR, MS)
6. displacement reactions (substitution and elimination)
7. reactions of compounds with single C-O bond
8. aromatic systems
9. nitrogen-containing compounds
10. radical reactions, polymerization
11. interconversion of functional groups
12. heterocyclic compounds
13. bio-organic compounds
14. introduction to synthetic strategies; sustainable organic synthesis

A draft of this proposal in Spanish is available from the project Web page (address below).

At the symposium, an active discussion followed on ways to help disseminate the draft curriculum to other universities. Involvement of national representatives of IUPAC's National Adhering Organization was considered an essential next step. Participants recommended contacting ministries of education, academies of science, and national chemical associations within their own countries to inform them about the project. Regional organizations, such as the Latin American Federation of Chemical Societies and the MERCOSUR, will be contacted after the proposal had been tested in 2004 and amended if necessary.

For more information contact the Task Group Chairman Norma S. Nudelman <nudelman@qo.fcen.uba.ar>.

www.iupac.org/projects/2002/2002-010-1-050.html

Provisional Recommendations

IUPAC Seeks Your Comments

Provisional recommendations are drafts of IUPAC recommendations on terminology, nomenclature, and symbols made widely available to allow interested parties to comment before the recommendations are finally revised and published in *Pure and Applied Chemistry*.

Nomenclature of Inorganic Chemistry

Since the publication of IUPAC's *Nomenclature of Inorganic Chemistry—Recommendations 1990* (the "Red Book"), inorganic chemistry has continued to expand and flourish, bringing with it the need to adapt and develop associated nomenclature. A revision of the Red Book was therefore initiated in 1998. This revised Red Book will supersede not only the 1990 Red Book but also, where appropriate, *Nomenclature of Inorganic Chemistry II—Recommendations 2000* (Red Book II). One of the main changes from the old Red Book is the different organization of material, adopted to improve clarity. Overall, the emphasis on additive nomenclature (generalized from the classical nomenclature of coordination compounds) which was already apparent in the 1990 Red Book, is reinforced. Examples are even included of organic compounds, from the borderline between inorganic and organic chemistry, which may be conveniently named using additive nomenclature.

The reader facing the problem of how to name a given compound or species may find help in several ways. A flowchart is provided that will in most cases guide the user to a section or chapter where rules can be found for generating at least one possible name. A more detailed subject index is also provided, as well as an extended guide to possible alternative names of a wide range of simple inorganic compounds.

Comments by 31 August 2004

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www.iupac.org/reports/provisional/abstract04/connelly_310804.html

Numbering of Fullerenes

Rules for numbering $(C_{60}\text{-}I_h)[5,6]$fullerene and $(C_{70}\text{-}D_{5h(6)})[5,6]$fullerene were codified in a publication "Nomenclature for the $(C_{60}\text{-}I_h)[5,6]$ and $(C_{70}\text{-}D_{5h(6)})[5,6]$fullerenes" published in *Pure and Applied Chemistry*, **74**(4), 629-695, 2002.

The current publication contains recommendations for numbering a wide variety of fullerenes of different sizes, and of various point group symmetries, including low symmetries such as C_s, C_i, and C_1, as well as many fullerenes that have been isolated and structurally well characterized. These recommendations are based on the principles established in the earlier publication, and aim to identify well-defined, and preferably contiguous helical pathway for numbering. Rules for systematically completing the numbering of fullerene structures the numbering of which becomes discontinuous are presented.

Comments by 31 August 2004

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www.iupac.org/reports/provisional/abstract04/powell_310804.html

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Rheological and Mechanical Properties of Poly (α-Methylstyrene-*co*-acrylonitrile)/Poly (Methylacrylate-*co*-methyl methacrylate) Blends in Miscible and Phase-Separated Regimes of Various Morphologies. Part IV. Influence of the Morphology on the Mechanical Properties (IUPAC Technical Report)

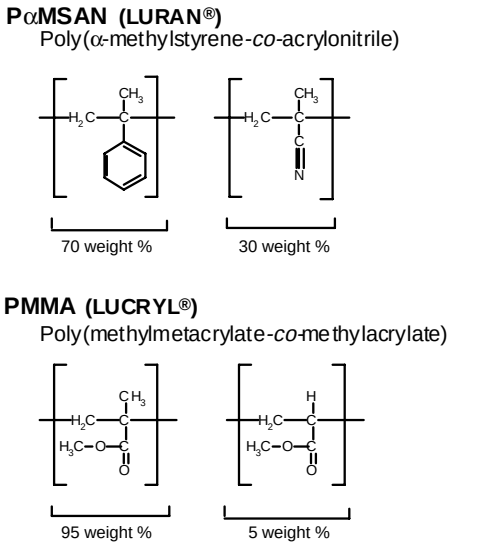
by V. Altstädt, L. De Lucca Freitas, and D.W.Schubert

Pure and Applied Chemistry
Vol. 76, No. 2, pp. 389–413 (2004)

Influences of the morphology on the thermal and mechanical properties of poly (α-methylstyrene-*co*-acrylonitrile)/poly(methylacrylate-*co*-methyl methacrylate) (PαMSAN/PMMA) blends have been investigated. Differential scanning calorimetry (DSC) measurements confirmed that all blends were phase separated due to the temperature at which they were extruded and squeeze molded. Based on the cloud points of 17 blends and transmission electron microscopy (TEM) micrographs, the interaction parameters as a function of temperature and composition were calculated for the lower critical solution temperature (LCST) system. The morphology of the system was varied by annealing without changing its composition, but no clear conclusions on the influence of morphology on fracture toughness could be. In situ strained thin sections in the TEM indicated no effect of annealing on the micromechanical behavior. Shear deformation was observed as the prevailing deformation mechanism in the PαMSAN and fibrillized crazing in the PMMA-rich blends. From the features of the fracture surface investigated by scanning electron microscopy (SEM), the conclusion can be drawn that the fatigue crack propagates faster in the more brittle PαMSAN phase, but the overall advance of the crack front is controlled at the interphases, resulting in a crack propagation gradient along the interphase.

Scanning electron micrograph of the annealed PαMSAN/PMMA 40/60 blend. Crack propagation velocity: 10-5 mm/cycle. (Magnification: 130x)

www.iupac.org/publications/pac/2004/7602/7602x0389.html



Chemical structures of PαMSAN and PMMA.

Determination of Trace Elements Bound to Soils and Sediment Fractions (IUPAC Technical Report)

by József Hlavay, Thomas Prohaska, Márta Weisz, Walter W. Wenzel, and Gerhard J.Stingeder

Pure and Applied Chemistry
Vol. 76, No. 2, pp. 415–442 (2004)

Geoscientists and environmental engineers extensively use results of chemical speciation analysis and this paper presents an overview of methods for chemical speciation analysis of elements in samples of sediments and soils. The sequential leaching procedure is thoroughly discussed, and examples of different applications are shown. Despite some drawbacks, the sequential extraction method can provide a valuable tool to distinguish among trace element fractions of

different solubility related to mineralogical phases. The understanding of the speciation of trace elements in solid samples is still rather unsatisfactory because the appropriate techniques are only operationally defined. The essential importance of proper sampling protocols is highlighted, since the sampling error cannot be estimated and corrected by standards. The Community Bureau of Reference (BCR) protocols for sediment and soil give a good basis for most of the solid samples, and the results can be compared among different laboratories.

www.iupac.org/publications/pac/2004/7602/7602x0415.html

Terminology for Analytical Capillary Electromigration Techniques (IUPAC Recommendations 2003)

Marja-Liisa Riekkola, Jan Åke Jönsson, and Roger M. Smith

Pure and Applied Chemistry
Vol. 76, No. 2, pp. 443–451 (2004)

Capillary electromigration techniques are popular and important in chemical analysis, especially in the bioanalytical field. Some of the related terminology has been discussed in a paper on the terminology of electrophoresis in clinical chemistry, but in many cases this is not applicable to capillary techniques and does not fully take into account existing IUPAC definitions. Earlier work on the terminology of electroseparation techniques was not harmonized with the IUPAC nomenclature of chromatography. This paper discusses and defines the relevant terms needed in current practice, including names of the various techniques using electromigration principles.

The separations in capillary electromigration techniques are achieved in narrow capillaries by employing a high electric field strength. These techniques include capillary electrophoretic techniques and electrically driven capillary chromatographic techniques, based on different separation principles. In some cases, these principles overlap. Capillary electrophoretic techniques have proved to be highly effective for the separation of small organic and inorganic ions, pharmaceuticals, explosives, dyes, polymers, proteins and peptides, DNA and RNA, cells, particles, etc. The presence of electroosmotic flow may contribute to separation even though it is not always needed (e.g., in isoelectric focusing), or may even be completely undesired.

www.iupac.org/publications/pac/2004/7602/7602x0443.html

Structure and Dynamics in Liquids

Pure and Applied Chemistry
Vol. 76, No. 1, pp. 1–261 (2004)

reviewed by Roberto Fernández-Prini

A joint meeting of the European and Japanese Molecular Liquid Groups (EMLG and JMLG) was held 7 to 15 September 2002 in Rhodes, Greece, under the auspices of IUPAC. The theme of the meeting was Novel Approaches to the Structure and Dynamics in Liquids: Experiments, Theories, and Simulation. It was organized in parallel with a NATO Advanced Study Institute, which meant that scientists as well as students attended.

Twenty-nine papers from the meeting have been published in *Pure and Applied Chemistry,* **76** (1), 1–261 (2004). The main objective of these contributions was to obtain descriptions of the behavior of liquids and their solutions at the molecular level; however, more classical information (e.g., thermodynamic properties) was also reported in many of them. It is interesting to note that the majority of the published works employed molecular simulation tools to back their experimental or theoretical results. This is a reasonable and healthy trend in physics and chemistry.

The papers cover many different molecular liquids and their solutions, new techniques, and theoretical methods. They discuss very simple systems, like mixtures of isotopomers, to more complicated ones including polymeric liquids and interfacial structure, as well as ionic liquids and supercritical fluids.

The two latter types of solvents are of great practical importance at present because of their potential use in many chemical and other industrial processes due to their benign effect on the environment. Looking at the set of published conferences, the evolution of the field of molecular liquids becomes quite clear; the present scenario is quite different from that observed one or two decades ago. Now molecules and their interactions are the main actors and understanding their detailed behavior is an important goal. In turn this will lead to knowledge about how their properties can be controlled to serve more closely the purpose of solvents in different processes.

A paper by G. Jancsó analyzes the possibility of nonideal behavior in isotopomer mixtures. Jancs 's study yielded information about intermolecular forces as well as the effect of the different volumes (or sizes) of the isotopomers. Excess thermodynamic properties of the mixtures, including vapor pressure, were used as a basis to estimate the nonideality of the mixture.

V. A. Durov's paper describes the performance of quasichemical models to describe associative processes (supramolecular ordering). In his study, interactions were separated into different types and the formation of different kinds of aggregates was considered. In his paper, he shows that this model can be used to account for the dielectric behavior of mixtures, as well as light scattering, and that it can describe dynamic properties.

Four articles analyzed the effect of long-range fluctuations, which are typical of critical phenomena, on the behavior of different systems. W. Schröer and H. Weingärtner discussed, within the restricted primitive model, the features of the critical point for ionic systems that interact through long-range coulombic forces. They showed that solutions of ionic liquids in relatively low dielectric constant solvents behave similarly to more conventional electrolytes. M. Besnard and coworkers contributed two other papers referring to critical phenomena in fluids. They used spectroscopic techniques to study the behavior of the fluids under near-critical conditions that are relevant to the use of supercritical fluids in many processes. Using IR spectroscopy and incoherent neutron scattering they suggested the presence of aggregates, up to trimers, in water at 380 °C at different densities. In the second paper they studied local density inhomogeneities in pure hexafluorbenzene employing Raman spectroscopy; they reported the existence of these inhomogeneities in the pure fluid. The contribution of M. Musso *et al.* reported the effect of the critical line broadening of Raman bands for fluid N_2. This study showed the high sensitivity of the Raman band to changes in intermolecular interactions. Long-range fluctuations of fluid density affect more the line shape than the line width.

Clusters of water were the subjects of two contributions. A. Vegiri used molecular simulation to analyze the enhanced relaxation of some water clusters in the presence of weak electric fields. The effect was attributed to an increase in the vibrational amplitude of individual water molecules. J. M. Bowman and S. S. Xantheas described the details of the vibrational modes of $Cl^-(H_2O)$. Their approach suggests it is necessary to revise interacting potentials that had been developed previously.

H. Krienke's paper discussed his studies of thermodynamic and structural properties of molecular liquids and electrolyte solutions using integral equations and simulation experiments. The paper describes ion solvation and association in several solvents of different polarity, underlining the important role of polarizabil-

ity. N. Nishiyama et al. reported the results of the study of the solvation dynamics of ions dissolved in acetonitrile using the reference interaction-site model together with mode-coupling theory. Molecular dynamics was also employed to study structure of ionic liquids and, in another contribution, the same simulation procedure was used to calculate time correlation functions for methanol.

A number of papers refer to the use of modern experimental techniques. The contributions of M. G. Giorgini and H. Torii describe the use of the Raman non-coincidence effect. This is a novel spectroscopic method that provides a very sensitive experimental tool to discriminate between dipolar and hydrogen bonding intermolecular interactions. In another paper, E. Pontecorvo *et al.* present another new spectroscopic technique, which consist of X-ray inelastic scattering to study vibrational dynamics in molecular liquids. This method was observed to be sensitive to vibrational dynamics at length scales typical of intermolecular distances; the liquid studied was glycerol at ambient temperature. Mizuno *et al.* reported the development of an external reference method of NMR that obtained values of the chemical shifts on a unified scale; results for water and methanol are presented.

Two other papers describe the use of modern techniques to study the structure in solutions. EXAFS was used to describe the solvation of ions dissolved in water and alcohols and ultrasonic birefringence was used to study polymer mixtures.

Several papers describe the use of the molecular dynamic simulation technique, either classical or hybrid, to describe structural and dynamic features of solutions. Other papers report the results of using spectroscopic techniques, light-scattering, transport of ions in dense fluids, interfacial proton transfer, and structure and dynamics in molten zinc and manganese halides. Cu phthalocyanines have been studied by resonance Raman spectroscopy to evaluate the effect of substituents and the aqueous medium on the aggregation and photochemical properties of these molecules.

In summary, the EMLG-JMLG meeting was successful having fulfilled to a large extent their ambitious goal. Many modern theoretical, experimental, and simulation results were presented, showing that scientists in this field, which is extremely active, are able nowadays to describe very subtle effects that are important for the structure and the dynamics in liquid phase, either for pure liquids or for mixtures.

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Special Topic Articles Featuring the 2003 Winners of the IUPAC Prize for Young Chemists

Pure and Applied Chemistry, Vol. 76, No. 2, pp. 263–319, 2004

The IUPAC Prize for Young Chemists seeks to encourage participation of young scientists throughout the world in an annual competition that requires candidates to submit short essays based upon the topic of their Ph.D. studies.

Starting in 2002, prizewinners have been invited to submit manuscripts on aspects of their research topics for consideration as short, critical review articles to be published in *Pure and Applied Chemistry*. Following peer review, the first collection appeared in *PAC*, **74**, 2021–2081 (2002), and encouraged the view that it offers sufficient readership appeal to become a regular special topic feature of the journal. The works of the 2003 prizewinners appear in the February 2004 issue of *Pure and Applied Chemistry*, including the following critical reviews:

- "Photodegradation and Photosensitization in Pharmaceutical Products: Assessing Drug Phototoxicity," by **Gonzalo Cosa**
- "Recent Developments in the Coordination Chemistry of Stable Free Radicals, by **Martin Trent Lemaire**
- "Simulations on Many Scales: The Synapse as an Example," by **Kaihsu Tai**
- "Understanding the Reaction that Powers This World: Biomimetic Studies of Respiratory O_2 Reduction by Cytochrome Oxidase," by **Roman Boulatov**

www.iupac.org/publications/pac/2004/7602/index.html

The Red Book II in Hungarian

Szervetlen Kémiai Nevezéktan, II
Prepared by Piroska Fodor-Csányi (in Hungary: Fodorné Csányi Piroska)
Akadémiai Kiadó, Budapest, 2003, 138 pp.

The book is the Hungarian adaptation of *IUPAC Nomenclature of Inorganic Chemistry II, Recommen-dations 2000*, edited by J. A. McCleverty and N. G. Connelly. The Hungarian adaptation of the first *IUPAC Nomenclature of Inorganic Chemistry* (Recommendations 1990) was completed in 1995 by the nomenclatures of polyanions, isotopically modified inorganic compounds, tetrapyrroles, hybrides of nitrogen, inorganic chain and ring compounds, and as graphite intercalation compounds. Names and symbols of the elements approved by IUPAC are listed in the book including the name darmstadtium and symbol Ds of element of atomic number 110. The appendix contains the names of hydrogen atoms, ions and groups, transfermium elements, inorganic radicals, and muonium and its ions. The naming of new elements is discussed in detail.

www.iupac.org/publications/books/author/RBII-hungarian.html

Alkali and Alkaline Earth Metal Pseudohalides

Jiri Hála and H. Akaiwa
IUPAC-NIST Solubility Data Series, 79
Journal of Physical and Chemical Reference Data, Vol. 33, No. 1, pp. 1–176, 2004

This volume presents solubility data of azides, cyanides, cyanates, and thiocyanates of alkali metals, alkaline earth metals, and ammonium. Covered are binary and ternary systems in all solvents. No solubility data have been found for some of the compounds of alkali metals, alkaline metals, and ammonium. These include beryllium and magnesium azides, lithium, rubidium cesium, ammonium, and alkaline earth cyanates and cyanides, and beryllium thiocyanate. Likewise, no solubility data seem to exist for selenocyanates of the mentioned metals and ammonium. The literature has been covered up to the middle of 2001, and there was a great effort to have the literature survey as complete as possible. The few documents that remained unavailable to the editor, and could not be included in the volume, are listed in the appendix.

www.iupac.org/publications/sds/2004/79_abstract.html

IUPAC Handbook 2004—2005

IUPAC (2004), pp. ix + 1-318
ISBN 0-9678550-7-1

The new edition of the *IUPAC Handbook*, available for sale now from the Secretariat and also posted on the IUPAC Web site, contains updated listings and information on all aspects of IUPAC's organization. Included in the new Handbook are current listings of organization and membership for all IUPAC divisions, commissions, and committees. Also included are recently revised lists of IUPAC National Adhering Organizations, Associate National Adhering Organizations, IUPAC officers, and projects.

While the traditional contents of the *Handbook* has been updated, this year, the sections have been reordered to (hopefully!) facilitate use and reference. The multiples appendixes listing recently published IUPAC reports and IUPAC-sponsored symposia and conferences, describing procedures for publication of IUPAC technical reports and recommendations, and providing guidelines for drafting IUPAC technical reports and recommendations, have been entirely integrated into various sections. The second half of the *Handbook* is the directory of all IUPAC members and fellows.

www.iupac.org/publications/books/author/handbook04.html

Emerging Issues in Analytical Chemistry

Ryszard Lobinski

The IUPAC Congress brings together eminent scientists from all over the world and is a landmark event in chemistry. It is also an invaluable source of ideas for IUPAC if divisions can attract participation of key scientists in their working meetings at the associated General Assembly. This was demonstrated by a mini-workshop on **New Challenges for Analytical Chemists in Genomics, Proteomics, and Genetically Modified Organisms** (GMOs) held on 10 August 2003. The workshop was organized by the Analytical Chemistry Division and included in its annual division committee meeting held at the IUPAC General Assembly in Ottawa.

The speakers who graciously accepted invitations to the workshop were Dr. Aled Edwards, director of the Genomic Consortium, University of Toronto; Dr. Jim McLaren; director of the Chemical and Mechanical Standards, National Research Council, Ottawa; and Dr. Heinz Schimmel, IRMM, Geel, Belgium.

Aled Edwards discussed the increasing role of mass spectrometry in the multibillion-dollar industry of identification and prediction of disease states. He evoked the need for standardization of analytical mass spectrometric methods, qualitative fingerprinting, and quantitative determination. Jim McLaren and Heinz Schimmel discussed the needs for accurate measurements of DNA in view of the increasing role of genetically modified organisms and regulatory trends.

A very positive outcome from this workshop was the identification of three potential projects: "Standard Definitions of Terms Relating to Mass Spectrometry," "Comparison of the Terms: Preconcentration/Sample Preparation as Used in GMO Analysis and in Classical Analysis," and "Terminology Related to Analytical Chemistry of Metal Forms in Biological Systems: Metallomics." The formation of a task group for the first topic was coordinated by Kermit Murray (Louisiana State University), and the project has already been approved by the division (see page 23). Proposals are currently being drafted for the latter two topics.

Building on the success of this workshop—more recently and in the framework of the Analytical Chemistry Division Committee Meeting—a workshop was held 16–17 February 2004 in Vienna on **Emerging Issues in Metrology in Chemistry**. The meeting was opened by W. Burkart (deputy director general of the International Atomic Energy Agency) and A. Fajgelj (chair of IUPAC Interdivisional Working Party on Harmonization of Quality Assurance). It attracted an additional 17 participants, mostly representing IAEA.

Five lectures were given by invited speakers and IUPAC members. Robert Wielgosz, head of the Metrology in Chemistry department at the International Bureau of Weights and Measures (BIPM), presented a lecture on key comparisons at BIPM: purpose, examples, mutual recognition arrangement, and calibration and measurement capabilities. This was followed by a presentation on metrological traceability and measurement uncertainty concepts by Paul DeBiévre (IUPAC). Leslie Pendrill (secretary of the IUPAP Commission on Symbols, Units, Nomenclature, Atomic Masses and Fundamental Constants) gave a physicist's view on future needs for metrological traceability and Otto Loesener-Diaz (industrial development officer at United Nations Industrial Development Organization [UNIDO]) presented UNIDO activities in metrology and related issues. The symposium finished with a review of metrological traceability in special fields presented by Manfred Groening (head of the Isotope Hydrology Laboratory at the IAEA) and A. Fajgelj.

The mini-symposium was a welcome learning event. Metrology in chemistry has been identified, together with continuing efforts in the field of quality assurance, as one of the focal areas for the Analytical Chemistry Division medium-term plan. The basic aim of the workshop was to inform committee members and other participants on the status of the field and current international initiatives. In parallel this workshop provided an excellent opportunity to present and discuss the background and plan for the IUPAC proposal for the International Council of Science grant program 2005. Moreover, this workshop helped strengthen the existing cooperation among IUPAC, IUPAP, and IAEA and also to expand it to UNIDO. After the event, a courtesy visit was paid to D. Liang and O. Loesener at UNIDO to discuss the possible involvement of UNIDO in the IUPAC proposal submitted to ICSU on "Metrological Traceability: A Fair Basis for Trade."

Both of these experiences have encouraged the Analytical Chemistry Division to work more constructively with the next IUPAC Congress scheduled in Beijing in August 2005. Keeping in touch with the emerging needs of analytical chemistry is one of the main objectives of the division.

Any questions/comments/suggestions should be addressed to the division officers; for more information see <www.iupac.org/divisions/V/index.html>.

www.iupac.org/divisions/V/index.html

XVII Mendeleev Congress on General and Applied Chemistry

by Oleg Nefedov and Oleg Sinyashin

The **XVII Mendeleev Congress on General and Applied Chemistry** was held 21–26 September 2003 in Kazan, the capital of Tatarstan, Russia.

Mendeleev Congresses are the most prestigious Russian chemical forums, with great international importance. They determine the primary direction in the development of chemistry, chemical technology, and chemical education. Organized in well-known scientific and cultural centers of Russia, the Congress is held every fifth year. The first Mendeleev Congress was held in Petersburg in 1907; it was devoted to the memory of D. I. Mendeleev, who died that year.

The XVII Mendeleev Congress was organized by the Russian Academy of Sciences (RAS); the Mendeleev Russian Chemical Society; the National Committee of Russian Chemists; the Ministry of Industry, Science, and Technologies of the Russian Federation; the Ministry of Education of the Russian Federation; the Government of the Republic of Tatarstan; and the Academy of Sciences of the Republic of Tatarstan. The congress was held under the sponsorship of IUPAC with the participation of President P. S. Steyn, Vice President L.K. Sydnes, and a group of IUPAC Bureau and Executive Committee members.

Twelve hundred scientists and specialists from the Russian Federation, CIS countries, and other European, Asian, and American countries participated in the XVII Mendeleev Congress in Kazan.

The congress opened at the modern Piramida hall, which was built in late 2002 in the heart of Kazan near the Kazan Kremlin. Academician O. M. Nefedov, president of the congress, delivered an opening address. Nefedov read a welcome message from the president of the Russian Federation, V. V. Putin, to the delegates and guests of the congress. The president of the Republic of Tatarstan, M.Sh. Shaimiev considered the prospects for developing chemical sciences, education, and industries in Tatarstan.

Fifteen plenary lectures were delivered at the opening and subsequent plenary sessions of the congress. Academician A. I. Konovalov, chair of the Presidium of the Kazan Scientific Center of the RAS, devoted his lecture to the history and current status of the Kazan school of organic chemistry.

The Kazan Kremlin.

The plenary lecture of Nobel Prize winner J.-M. Lehn (France) was devoted to the general problems of the evolution and self-organization of chemical matter considered in terms of supramolecular chemistry, which has rapidly developed in recent years. The plenary lecture of academician A. L. Buchachenko (N. N. Semenov Institute of Chemical Physics, RAS) was devoted to the physical chemistry of nanosized particles and the design of subminiature devices on this basis.

P. Atkins (UK), professor at Oxford University and chair of the IUPAC Committee on Chemistry Education, delivered a well-illustrated plenary lecture on various aspects of chemical education. In his plenary lecture, S. Hecker (Los Alamos National Laboratory, USA) considered the unusual properties of plutonium and other actinides and demonstrated the role of these elements in materials science.

Academician Yu.Ts. Oganesyan (Joint Institute for Nuclear Research, Dubna, Russia) delivered a plenary lecture on the unique results of the nuclear synthesis of superheavy elements (113, 114, 115, 116, and 118) and on the experimental support for a hypothesis that so-called stability islands occur among these elements.

In his lecture, academician Yu.D. Tret'yakov (Moscow State University) considered chemical aspects and prospects for the development of new functional materials, including superconducting cuprates, magnetoresistive manganites, oxide ion conductors, electron-ion conductors, and photonic crystals, as well as new processes for the production of the above materials based on synergistic physicals and chemical processes.

E. N. Kablov (All-Russia Institute of Aviation Materials, Russia) presented a concept of the balanced doping of new high-temperature materials with single-crystal structures based on an analysis of the effects of new dopants (Re and Ru) on the physico-

chemical, kinetic, and structural parameters of the phase stability of alloys.

The plenary lecture of Professor H. Ringsdorf (Germany) demonstrated the widest possibilities of polymer chemistry for the development of anticancer polymer agents, including clinically used drugs, and selective systems for drug delivery directly to tissues and cells affected by malignant tumors. The plenary lecture of Academician V. A. Kabanov (Moscow State University) was devoted to original approaches to the development of a new generation of polymer-subunit vaccines based on conjugated synthetic polyelectrolytes with microbial antigens, the physicochemical mechanisms of their biological action, and the prospects for the use of the approach developed. Professor S. D. Varfolomeev (Moscow State University) delivered a plenary lecture in which he characterized the state-of-the-art genetic engineering of enzymes, proteomics, biopolymer structure, and biocatalysis and analyzed new approaches to the design of drugs based on the knowledge of the structure of biological targets.

The opening ceremony of the conference.

The plenary lecture of Nobel Prize winner R. Noyori (Japan) was devoted to the synthesis of complex practically important compounds "from almost nothing" (in his words) with the use of readily available raw materials and environmentally appropriate technologies. Dr. E. Reichmanis, president of the American Chemical Society, presented a plenary lecture that demonstrated how small (multidisciplinary) teams of specialists in various areas can rapidly and efficiently solve the problems of scientific and technological development and meet the society and market requirements.

Academician V. E. Fortov (Institute of the Thermal Physics of Extreme States, Joint Institute for High Temperatures, RAS, Moscow) delivered a plenary lecture on dynamic methods for the generation of high local energy concentrations in condensed media.

The final plenary lecture was delivered by academician G. B. Elyakov, who headed the Pacific Institute of Bioorganic Chemistry and the Far East Branch of the RAS for many years. He considered the results of extensive studies on the interpretation of structures of natural compounds from marine organisms, primarily, low-molecular bioregulators and a number of biopolymers, and the synthetic transformations of them.

A Russian-French symposium on supramolecular chemistry resulted in the organization of the Russian-French (European) laboratory on Supramolecular Systems in Chemistry and Biology under the aegis of the Russian Foundation for Basic Research and CNRS. Joint research works, joint symposiums, summer schools for young scientists, and scientific exchanges will be held based on this laboratory.

The section "Chemical Education" and the Russian-American Workshop on Chemical Education focused attention on the problems of chemical education in Russia and the integration of education and scientific research.

About 1650 papers on the main branches of fundamental science, chemical education, new technologies, and historical aspects of chemistry were presented at the congress. About 200 scientists delivered oral presentations at section sessions and symposiums. More than 1400 papers were presented at poster sessions. The congress expressed the trend of the scientific community to support and develop the organization of interdisciplinary studies and the cooperation of scientific schools in Russia, as well as with the participation of foreign research centers.

Roundtable meetings on the environmental safety of the chemical industry (G. F. Tereshchenko, coordinator) and on the development of innovative activities in the Russian Federation (S. M. Aldoshin, coordinator) were held with great success. A roundtable meeting of the presidents of chemical societies from 15 CIS countries and other countries of Europe, Asia, and North America, with the participation of IUPAC and UNESCO leaders, took place for the first time in the past decade (Mar-Apr 2004 *CI*, p. 18). The meeting, which was coordinated by P. D. Sarkisov and O. M. Nefedov, focused on how to increase the participation of chemical societies from former Soviet Union countries in international scientific and engineering organizations. Participants agreed that these societies should be associated members of IUPAC and that a regional IUPAC organization should be founded later on.

The congress closing ceremony took place at the S.

Saidashev State Grand Concert Hall, which is one of the most beautiful cultural centers of Kazan. In addition to two plenary lectures, the results of the congress were summarized, and the final document *On the Prospects for the Development of Chemistry, Chemical Education, and International Cooperation* was approved. Dr. R. N. Minnikhanov, prime minister of the Government of the Republic of Tatarstan, addressed the meeting.

The next XVIII Mendeleev Congress on General and Applied Chemistry will be held in Moscow in 2007 and will be devoted to a centenary of Mendeleev Congresses in Russia.

Professor Oleg Nefedov <nefedov@ras.ru> is head of the laboratory in the N. D. Zelinsk, Institute of Organic Chemistry in Moscow and the president of the XVII Mendeleev Congress. Professor Oleg Sinyashin <oleg@iopc.knc.ru> is director of the A. E. Arbuzov Institute of Organic and Physical Chemistry in Kazan and chief secretary of the XVII Mendeleev Congress.

Joint Meeting on Medicinal Chemistry—Kraków 2003

by Barbara Malawska and Katarzyna Kiec-Kononowicz

The **Polish-Austrian-German-Hungarian-Italian Joint Meeting on Medicinal Chemistry** took place in Kraków, Poland, from 15–18 October 2003. This year's conference was a continuation of two previous joint meetings that had been held in Budapest, Hungary (Hungarian-German-Italian-Polish, 2001) and Taormina, Italy (Italian-Hungarian-Polish, 1999).

The meeting was held under the auspices of IUPAC and the European Federation of Medicinal Chemistry. It was organized by the following groups:

- Medicinal Chemistry Divisions of the Chemical Societies of Austria, Germany, Hungary and Italy
- Medicinal Chemistry Divisions of the Polish Chemical and Pharmaceutical Societies
- Faculty of Pharmacy, Medical College of the Jagiellonian University in Kraków
- Institute of Pharmacology of the Polish Academy of Sciences in Kraków
- Committee of Drug Design and Synthesis of the Polish Academy of Sciences

The conference was attended by 350 participants from 26 countries including Poland (135), Italy (80), Germany (35), Hungary (16), Russia (8), Turkey (7), Austria (5), Switzerland (5), and 18 other countries. Participants were presented with the latest ideas concerning drugs for the treatment of central nervous system and cardiovascular diseases, chemotherapeutics, combinatorial chemistry and high throughput screening, molecular modeling, peptides and peptidomimetics, and pharmaceutical biotechnology. In addition, 226 posters were presented.

Following is a list of plenary lectures presented:

- "G-Proteins: Targets for New Drugs?"; Walter Schunack, Free University of Berlin, Germany
- "Can Drug Metabolism be Predicted?"; Bernard Testa, Institute de Chimie Therapeutique, Universite de Lausanne, Switzerland
- "A Translational Approach to Preclinical Drug Development in Epilepsy"; James P. Stables, Director of the National Institute of Neurological Disorders and Stroke, Bethesda, USA
- "Rational Approaches to the Design of Ligands for Ionotropic Glutamate Receptors"; Tommy N. Johansen, Danish University of Pharmaceutical Sciences, Copenhagen, Denmark
- "Passive and Catalytic Antibodies and Drug Delivery"; G. Michael Blackburn, Krebs Institute, Scheffield University, Great Britain.

The organizers also prepared a rich social program for conference participants, which included a welcome party in a restaurant on the Wawel Castle and sightseeing tours to major monuments of Krak w. The conference was crowned with a reception in the exhibit rooms of the National Museum of the Cloth Hall.

The program of the conference was released in the form of a book of abstracts: *Polish-Austrian-German-Hungarian-Italian Joint Meeting on Medicinal Chemistry* (ISDN 83-919157-1-9). The full texts of the plenary and invited lectures will be published in *Pure and Applied Chemistry* and in a CD version, which will also include all the posters.

The meeting proved to be a very successful scientific event, and an excellent opportunity to exchange ideas and introduce the most recent research in the field of medicinal chemistry. The next meeting will be held in 2005, with the location t7o be determined.

Barbara Malawska <mfmalaws@cyf-kr.edu.pl> was a member of the Organizing Committee and is an associate professor at Jagiellonian University, Medical College in the Department of Pharmaceutical Chemistry. Katarzyna Kiec-Kononowicz <mfkonono@cyf-kr.edu.pl> was the head of the Organizing Committee and is a professor at Jagiellonian University, Medical College and the head of the Department of Chemical Technology of Drugs.

Functional and Nano-Systems

13–17 June 2004, Missoula, Montana, USA

The **2nd International Symposium on Macro- and Supramolecular Architectures and Materials: Functional and Nano-Systems** (MAM 04) will be held 13–17 June 2004 in Missoula, Montana, USA. As functional and nanosystems will play key roles in science and technology in the 21st century, the objectives of this symposium are to provide an interdisciplinary forum for scientists engaged in the full spectrum of research, development, and application to discuss the current status and recent developments of these systems with respect to their macro- and supramolecularity. In addition, the meeting will provide an opportunity to overview the field by covering a wide range of topics. Themes have been selected to accommodate a wide range of interests in both academic fields and industrial science and technology.

www.umt.edu/chemistry/mam04

Pharmaceutical R&D

3–5 July 2004, Beijing, China

The **International Pharmaceutical R&D Forum** to be held in Beijing on 3-5 July 2004 is jointly organized by the Tristate Chinese American Chemical Society of the U.S. and the China Center for Pharmaceutical International Exchange of China's State Food & Drug Administration. Forum speakers will include vice president's and directors of research from companies such as Merck, Glaxo, and Wyeth and senior officials from China's State Food & Drug Administration and China's State Patent Agency. This forum will focus on the recent progress of drug discoveries in world major pharmaceutical companies, outsourcing in the pharmaceutical industry, regulations for new drug approval in China, and China's IP protection. This forum will also provide an opportunity to meet with influential decision makers from major world pharmas, the emerging Chinese pharmaceutical industry, and the Chinese state agencies.

www.pharmaforum2004beijing.org

Natural Products

31 July–4 August 2004, Phoenix, Arizona, USA

The **2004 International Congress on Natural Products Research** will be a Joint Meeting of the American Society of Pharmacognosy, Association Française pour l'Enseignement et la Recherche en Pharmacognosie, Gesellschaft für Arzneipflanzen -forschung (Society for Medicinal Plant Research), and Phytochemical Society of Europe.

Scientific highlights include a Classical Pharmacognosy Pre-Congress Symposium, Biotechnology Symposium, Herbal Symposium dedicated to Varro (Tip) Tyler, and Sea and Sand Symposium. Additionally, there will be award presentations by the American Society of Pharmacognosy (the Research Achievement Award and the The Varro E. Tyler Prize for Research in Botanicals, sponsored by Pharmanex) and the Gesellschaft für Arzneipflanzenforschung (Egon Stahl Award).

www.phcog.org/AnnualMtg/Phoenix.html

Analytical Chemistry

5–10 September 2004, Salamanca, Spain

EUROANALYSIS is the series of biennial conferences on Analytical Chemistry in Europe initiated by the Division of Analytical Chemistry of the Federation of European Chemical Societies (DAC-FECS). **EUROANALYSIS XIII**, organized by the Spanish Society of Analytical Chemistry and in cooperation with the Department of Analytical Chemistry, Nutrition and Food Science, University of Salamanca, will be held 5–10 September 2004 in Salamanca, Spain. A broad spectrum of analytical topics will be covered under the banner "The Role of Analytical Chemistry in the Protection of the Citizens." The conference should be highly interesting for the community of analytical sciences.

This meeting, specially devoted to young analytical chemists, is open to contributions from all analytical fields. The program will comprise invited lectures, workshops, oral contributions, and poster presentations in the following fields:

- impact of analytical chemistry on the quality of life
- innovative analytical tools and processes
- fast-response analytical systems
- the role of information technologies in analytical chemistry
- food analysis
- analytical chemistry in health protection

In order to reinforce education on analytical chemistry and to promote the participation of young scientists, several short four-hour courses will be arranged. An exhibition of instruments, software and related products as well as literature will be integrated into the conference. Between the "get-together" on Sunday evening and the farewell on Friday midday, the participants will enjoy an exciting scientific program, as well as amusing social events in and around the city of Salamanca. This university city offers a cosmopolitan look, which blends extremely well with the old stones of its buildings, streets, and squares.

See calendar on page 41 for contact information

www.euroanalysis13.com

Soil Science

20–23 September 2004, Wuhan, China

The Fourth International Symposium of the Working Group MO "Interactions of Soil Minerals with Organic Components and Microorganisms (ISMOM)" of the International Union of Soil Sciences, **Environmental Significance of Mineral-Organic Component-Microorganism Interactions in Terrestrial Systems** will be held in Wuhan, China, 20–23 September 2004. The meeting will address timely topics covering dynamics and transformations of nutrients and pollutants in soils and the impact on environmental quality in the terrestrial ecosystem. It will serve as a forum for interactions of scientists of pertinent disciplines from developing and developed countries worldwide.

There will be plenary lectures and keynote lectures in six subsections: (1) transformations and dynamics of pollutants in soil environments, (2) chemical, biological, and biochemical processes in the rhizosphere, (3) bioavailability of metals and xenobiotics immobilized on soil components, (4) distribution and activity of biomolecules in terrestrial systems, (5) interactions between soil microbial biomass and organic matter/nutrient transformation, and (6) impact of interactions among soil mineral colloids, organic matter and biota on risk assessment and restoration of terrestrial ecosystems. This symposium is not only cosponsored by IUPAC, but also by the Chinese Academy of Sciences, the National Natural Science Foundation of China, and the Soil Science Society of China.

See calendar on page 41 for contact information

http://ismom2004.hzau.edu.cn/index.htm

How to Apply for IUPAC Sponsorship

Conference organizers are invited to complete an Application for IUPAC Sponsorship (AIS) preferably 2 years and at least 12 months before the Conference. Further information on granting sponsorhsip is included in the AIS and is available upon request from the IUPAC Secretariat or online at <www.iupac.org/symposia/application.html>.

Trace Elements

7–8 October 2004, Brussels, Belgium

The **2nd Symposium on Trace Elements in Food** (TEF-2) will be held 7–8 October in Brussels, Belgium. The meeting will consist of two full days of lectures and discussions, with 100 to 150 participants expected. The symposium will be a forum to bring together research institutions, authorities, and industry for the general exchange of knowledge and experience gained during recent years. It will also serve for the identification of areas where R&D efforts should be strengthened and/or redirected.

Trace elements may have different functions in the human and animal metabolism: some are toxic (e.g. Hg), others are essential to maintain good health (e.g. Ca); or, they can be essential but also toxic, depending on the concentration in the body or in parts thereof (e.g. Se). Therefore, it is important to have validated, efficient and harmonised methods on standby in the Member State laboratories concerned, not only with respect to food analysis but for other matrices influencing the trace element content of food, e.g. soil, water, feed, food additives etc.

The importance of various aspects of trace elements in relation to food is increasing steadily in the perception of the consumer and the respective authorities: food contaminants, essential and toxic elements, bio-availability and speciation, nutritional value and fortified food, reliable measurement of contents. In addition, through the many minor and major food-related incidents during recent years the consumer is becoming more concerned about the quality and safety of his food. As a result, research and development efforts in this area have also been increased and/or re-directed.

See calendar on page 41 for contact information

www.irmm.jrc.be

Environmental and Clinical Analysis

8–12 October 2004, Rome, Italy

The **6th Workshop on Biosensors and BioAnalytical m-Techniques in Environmental and Clinical Analysis**, organized by the International Association of Environmental Analytical Chemistry (IAEAC) and ENEA (Ente per le Nuove tecnologie, l'Energia e l'Ambiente, Italian National Agency for New Technologies, Energy and the Environment), will be held 8–12 October 2004 in Rome.

Recently the word "environment" has been acquiring a broader meaning. Prevention, monitoring, and depuration are now focused not only on the chemical detection of air, water, and soil pollutants but also on the health of the ecosystem, quality of life (including not only man but all living beings), clinical diagnostics and food safety, industrial activities and products, and effects from chemical, biological, and physical agents. Such a complex definition of "environment" meants that better measurement methods are needed, mainly in terms of number of analyses and costs, but also in terms of knowledge of the relationship between causes and effects.

The use of sensor-based analytical methods, originally focused on chemical and biochemical tests, is gaining increasing interest in the fields of environmental toxicity testing, for ecosystem monitoring as well as testing of crops and foods of animal origin, clinical diagnosis and therapy.

The increased interest in sensor-based techniques is proven by the significant number of both scientific papers and registered patents on this subject. Multidisciplinarity between chemistry, material sciences, biochemistry, molecular biology, physics, microelectronic technologies, and engineering has created important new ideas in several research fields, including biosensing. For these reasons, the workshop chairs and the scientific and local organizing committees are certain that the workshop will be a successful occasion for researchers to meet and generate new ideas and relevant results. Young researchers are encouraged to attend in order to contribute their enthusiasm and new ideas to the biosensing field.

www.biosensing.net/iaeac.html

Mark Your Calendar

Upcoming IUPAC-sponsored events
See also www.iupac.org/symposia
for links to specific event Web site

2004

17–21 May 2004 • Mycotoxins and Phycotoxins • Bethesda, Maryland, USA
11th International Symposium on Mycotoxins and Phycotoxins (ISMP-11)
Dr. Douglas L. Park (HFS-345), CFSAN, 5100 Paint Branch Parkway, College Park, MD, 20740, USA, Tel: +1 301 436 2401, Fax: +1 301 436 2644, E-mail: dpark@cfsan.fda.gov

23–26 May 2004 • Bio-interfaces • Barossa Valley, South Australia, Australia
The Ian Wark Research Institute International Conference & Workshop on Physical Chemistry of Bio-Interfaces
Prof. Hans Griesser, Ian Wark Research Institute, University of South Australia, Mawson Lakes Campus, Mawson Lakes, South Australia, Australia 5095, Tel.: +61 8 8302 3703, Fax: +61 8 8302 3683, E-mail: hans.griesser@unisa.edu.au

1–4 June 2004 • Biodegradable Polymers and Plastics • Seoul, Korea
8th World Conference on Biodegradable Polymers and Plastics
Prof. S. S. Im, Department of Polymer and Textile Engineering, Hanyang University, 17 Haengdang-dong, Seongdong-gu, Seoul 133-791, Korea, Tel.: +82 2 2290 0495, Fax: +82 2 2297 5859, E-mail: imss007@hanyang.ac.kr

14–18 June 2004 • π-Electron Systems • Ithaca, New York, USA
6th International Symposium on Functional π-Electron Systems
Prof. George Malliaras, Materials Science and Engineering, 327 Bard Hall, Cornell University, Ithaca, NY, 14853-1501, USA, Tel.: +1 607 255-1956, Fax: +1 607 255-2365, E-mail: george@ccmr.cornell.edu

21–23 June 2004 • Chemistry for Water • Paris, France
CHEMRAWN XV—Chemistry for Water
Chemrawn XV Organising Committee, 11, rue de Vanves, 92100 Boulogne, France, Tel.: +33 1 41 41 00 66, Fax: +33 1 41 41 09 68, E-mail: chemrawnXV@m2c.fr

27 June–1 July 2004 • Biomolecular Chemistry • Sheffield, United Kingdom
7th International Symposium on Biomolecular Chemistry (ISBOC-7)
Prof. George M. Blackburn, University of Sheffield, Department of Chemistry, Sheffield, S3 7HF, UK, Tel.: +44 114 222 9462, Fax: +44 114 273 8673, E-mail: g.m.blackburn@sheffield.ac.uk

27 June–2 July 2004 • Germanium, Tin, and Lead • Santa Fe, New Mexico, USA
XIth International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin, and Lead
Prof. Keith Pannell, Department of Chemistry, University of Texas at El Paso, El Paso, TX, 79968-0513, USA Tel.: +1 915-747-5796, Fax: +1 915-747-5748, E-mail: kpannell@utep.edu

4–9 July 2004 • Phosphorus Chemistry • Birmingham, United Kingdom
16th International Conference on Phosphorus Chemistry (ICPC 16)
Prof. Pascal Metivier, Rhodia, R&D for Phosphorous and Performance Derivatives, Oak House, reeds Crescent, Watford, WD24 4QP, UK, Tel.: +44 1923 485609, E-mail: pascal.metivier@eu.rhodia.com

4–9 July 2004 • Macromolecules • Paris, France
40th International Symposium on Macromolecules—IUPAC World Polymer Congress (MACRO 2004)
Prof. Jean-Pierre Vairon, Université Pierre et Marie Curie, Laboratoire de Chimie des Polymères, Case 185, 4 Place Jussieu, F-75252 Paris Cédex 05, France, Tel: +33 1 44 27 50 45, Fax: +33 1 44 27 70 89, E-mail: macro04@ccr.jussieu.fr

11–15 July 2004 • Polymer Biomaterials • Prague, Czech Republic
43rd PMM Microsymposium: Polymer Biomaterials: Biomimetic and Bioanalogous Systems
Drahomir Vyprachticky, Institute of Macromolecular Chemistry, Heyrovskeho nam. 2, CZ-162 06 Praha 6, Czech Republic, Tel.: +420 296 809 332, Fax: +420 296 809 410, E-mail: sympo@imc.cas.cz

17–22 July 2004 • Photochemistry • Granada, Spain
20th IUPAC Symposium on Photochemistry
Prof. Dr. Miguel A. Miranda, Departamento de Química/Instituto de Tecnologia Química UPV-CSIC, Universidad Politecnica de Valencia, Avenida de los Naranjos, s/n, E-46022 Valencia, Spain, Tel: + 34 963877807, Fax: + 34 963877809, E-mail: mmiranda@qim.upv.es

18–21 July 2004 • Chemical Sciences in Changing Times • Belgrade, Serbia and Montenegro
4th International Conference of the Chemical Societies of the South-Eastern European Countries
Prof. Ivanka Popovic, Belgrade University, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia and Montenegro, Tel.: +381 11 337 0478, Fax: +381 11 337 0473, E-mail: icosecs@elab.tmf.bg.ac.yu

Mark Your Calendar

18–23 July 2004 • Coordination Chemistry • Merida, Yucatan, Mexico
36th International Conference on Coordination Chemistry
Prof. Norah Barba-Behrens, Dept. de Química Inorgánica, Universidad Nacional Autónoma de México, Ciudad Universitaria, Coyoacán, México, D. F., 04510, México, Tel./Fax: +52(55)5622-3810, E-mail: norah@servidor.unam.mx

18–23 July 2004 • Polymers and Organic Chemistry • Prague, Czech Republic
11th International Conference on Polymers and Organic Chemistry 2004 (POC '04)
Dr. Karel Jerabek, Institute of Chemical Process Fundamentals, Rozvojova 135, 165 02 Prague 6, Czech Republic, Tel.: +420 220 390 332, Fax: + 420 220 920 661, E-mail: kjer@icpf.cas.cz

23–27 July 2004 • Carbohydrates • Glasgow, United Kingdom
22nd International Carbohydrate Symposium
Prof. E. Hounsell, School of Biological and Chemical Sciences, Birkbeck University of London, Malet St., London WC1E7HX, UK, Tel.: + 44 207 631 6238, E-mail: e.hounsell@bbk.ac.uk

25–29 July 2004 • Solubility Phenomena • Aveiro, Portugal
11th International Symposium on Solubility Phenomena, Including Related Equilibrium Processes (11th ISSP)
Prof. Clara Magalhaes, Department of Chemistry, University of Aveiro, P-3810-193 Aveiro, Portugal, Tel.: +351 234 401518, Fax: +351 234 370084, E-mail: issp@dq.ua.pt

25–30 July 2004 • Organometallic Chemistry • Vancouver, Canada
21st International Conference on Organometallic Chemistry (ICOMC)
21st ICOMC Secretariat, Conferences & Accomodation at UBC, 5961 Student Union Boulevard, Vancouver, BC, Canada V6T 2C9, Tel.: +1 604 822-1050, Fax: +1 604 822-1069, E-mail: registration@housing.ubc.ca

1–6 August 2004 • Organic Synthesis • Nagoya, Japan
15th International Conference on Organic Synthesis (ICOS-15) (see poster on inside back cover)
Prof. Minoru Isobe, ICOS15 Secretariat, c/o International Communications Specialists, Inc., Sabo Kaikan-bekkan, 2-7-4 Hirakawa-cho, Chiyoda-ku, Tokyo 102-8646 Japan, Tel: +81 3 3263 6474, Fax: +81 3 3263 7537, E-mail: icos@ics-inc.co.jp

2–7 August 2004 • Chemistry in Africa • Arusha, Tanzania
9th International Chemistry Conference in Africa—Chemistry Towards Disease and Poverty Eradication
Dr. G. S. Mhinzi, University of Dar es Salaam, Chemistry Department, PO Box 35061, Dar es Salaam, Tanzania, Tel./Fax: +255 22 2410038, E-mail: mhinzi@chem.udsm.ac.tz

3–8 August 2004 • Chemical Education • Istanbul, Turkey
18th International Conference on Chemical Education (18th ICCE)
Prof. Dr. Mustafa L. Berkem, Chairman, Marmara University, Ataturk Faculty of Education, TR- 81040 Goztepe-Istanbul, Turkey, Tel: +90 2163459090/231, Fax: +90 2163388060, E-mail: icce2004@marmara.edu.tr

15–19 August 2004 • Polymers • Bethesda, Maryland, USA
Polymer Networks 2004
Dr. F. Horkay, Section on Tissue Biophysics and Biomimetics, National Institutes of Health, Bldg. 13, Room 3W16E, 13 South Drive, Bethesda, MD 20892, USA, Tel: +1 301 435 7229, Fax: +1 301 435 5035, E-mail: horkay@helix.nih.gov

15–20 August 2004 • Physical Organic Chemistry • Shanghai, China
17th IUPAC Conference on Physical Organic Chemistry (ICPOC-17)
Prof. Guo-Zhen Ji, Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, 354 Fenglin Road, Shanghai 200032, China, Tel: +86 21-64163300, Fax: +86 21-64166128, E-mail: jigz@pub.sioc.ac.cn

17–21 August 2004 • Chemical Thermodynamics • Beijing, China
18th IUPAC Conference on Chemical Thermodynamics
Prof. Haike Yan, Chairman, 18th ICCT c/o Chinese Chemical Society, PO Box 2709, Beijing, 100080, China, Tel.: +86 10 62568157, +86 10 62564020, Fax: +86 10 62568157, E-mail: qiuxb@infoc3.icas.ac.cn

20–25 August 2004 • Heteroatom Chemistry • Shanghai, China
7th International Conference on Heteroatom Chemistry (ICHAC-7)
Prof. Lin-xin Dai, ICHAC-7, c/o Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, 354 Fenglin Road, Shanghai 200032, China, Tel: +86 21 64163300- 3405, Fax: +86 21 64166128, E-mail: ICHAC@pub.sioc.ac.cn

22–28 August 2004 • Biological Polyesters • Beijing, China
International Symposium on Biological Polyesters (ISBP 2004)
Prof. George Guo-Qiang Chen, Department of Biological Sciences & Biotechnology, Tsinghua University, 100084 Beijing, China, Tel.: +86 10 62794217, Fax: +86 10 62794217, E-mail: chengq@mail.tsinghua.edu.cn

Mark Your Calendar

3–5 September 2004 • Chemistry of Vanadium • Szeged, Hungary
4th International Symposium on Chemistry and Biological Chemistry of Vanadium
Prof. Tamas Kiss, University of Szeged, Department of Inorganic and Analytical Chemistry, PO Box 440, H-6701 Szeged, Hungary, Tel.: +36 62 544337, Fax: +36 62 420505, E-mail: tkiss@chem.u-szeged.hu

5–10 September 2004 • Analytical Chemistry • Salamanca, Spain
European Conference on Analytical Chemistry—Euroanalysis XIII
Prof. J. Hernández Méndez, Departamento de Química Analítica Nutrición y Bromatología, Universidad de Salamanca, E-37008 Salamanca, Spain, Tel./Fax: +34 923 294483, E-mail: jhm@usal.es

12–15 September 2004 • Heterocyclic Chemistry • Sopron, Hungary
XXI European Colloquium on Heterocyclic Chemistry
Prof. György Hajos, Chemical Research Center, Institute of Chemistry, H-1025 Budapest Pusztaszeri ut, Hungary, Tel.: +36 1 3257550, Fax: +36 1 3257863, E-mail: ghajos@chemres.hu

20–23 September 2004 • Soil Science • Wuhan, China
Environmental Significance of Mineral-Organic Component-Microorganism Interactions in Terrestrial Systems
Dr. P. M. Huang, Department of Soil Science, University of Saskatchewan, 51 Campus Drive, Saskatoon SK S7N 5A8 Canada, Tel.: +1 306 966 6838, Fax: +1 306 966 6881, E-mail: huangp@sask.usask.ca

7–8 October 2004 • Trace Elements in Food • Brussels, Belgium
2nd International Symposium on Trace Elements in Food (TEF 2)
Dr. Michael Bickel, European Commission—Joint Research Centre, Institute for Reference Materials and Measurements, B-2440 Geel, Belgium, Tel.: +32 14 57 17 34, Fax: +32 14 57 17 87, E-mail: michael.bickel@cec.eu.int

17–22 October 2004 • Biotechnology • Santiago, Chile
12th International Biotechnology Symposium
Prof. Juan A. Asenjo, Centre for Biochemical Engineering and Biotechnology, University of Chile, Beauchef 861, Santiago, Chile, Tel.: +56 2 6784288, Fax: +56 2 6991084, E-mail: IBS2004@conicyt.cl

7–11 December 2004 • Agriculture • Jesenik, Czech Republic
Chemistry for Agriculture
Dr. Adam Pawelczyk, Wroclaw University of Technology, Smoluchowskiego 25, 50-370 Wroclaw, Poland, Tel.: +48 (0) 71-3202930, Fax: +48 (0) 71 3203469, E-mail: adam.pawelczyk@pwr.wroc.pl

2005

17-21 July 2005 • Organometallic Chemistry • Geneva, Switzerland
13th International Symposium on Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS-13),
Prof. E. Peter Kündig, Department of Organic Chemistry, University of Geneva, 30 Quai Ernest Ansermet, CH 1211 Geneva 4, Switzerland, Tel.: +41 22 379 6526, Fax: +41 22 328 7396, E-mail: Peter.Kundig@chiorg.unige.ch

17–22 July 2005 • Carotenoids • Edinburgh, Scotland
14th International Symposium on Carotenoids
Prof. Andrew J. Young, School of Biological and Earth Sciences, John Moores University, Byrom St. Liverpool L3 3AF, UK, Tel.: +44 151 231 2173 / 3575, Fax: + 44 151 207 3224, E-mail: a.j.young@livjm.ac.uk

13–21 August 2005 • IUPAC 43rd General Assembly • Beijing, China
IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org

14–19 August 2005 • IUPAC 40th Congress—Innovation in Chemistry • Beijing, China
Prof. Xibai Qiu, IUPAC-2005 Secretariat, c/o Chinese Chemical Society, PO Box 2709, Beijing 100080, China, Tel.: +86 (10) 62568157, Fax: +86 (10) 62568157, E-mail: qiuxb@iccas.ac.cn

11–15 September 2005 • Boron Chemistry • Sendai, Japan
12th International Meeting on Boron Chemistry
Prof. Yoshinori Yamamoto, Department of Chemistry, Graduate School of Science, Tohoku University, Sendai, Japan 980-8578, Tel.: +81 22 217 6581, Fax: +81 22 217 6784, E-mail: yoshi@yamamoto1.chem.tohoku.ac.jp