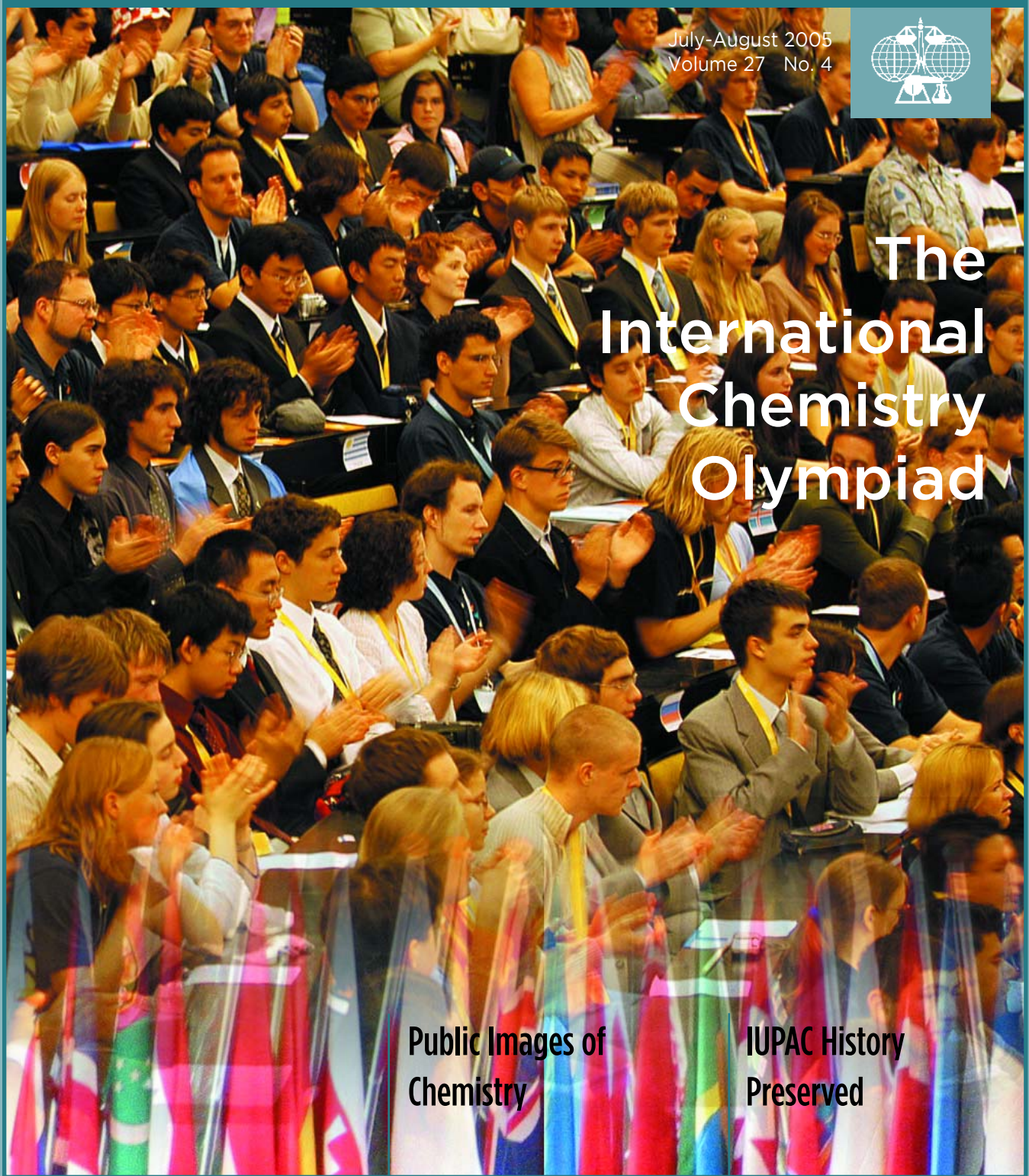
The News Magazine of the
International Union of Pure and
Applied Chemistry (IUPAC)

CHEMISTRY International

July-August 2005
Volume 27 No. 4



The International Chemistry Olympiad

Public Images of Chemistry

IUPAC History Preserved

CHEMISTRY International
The News Magazine of the International Union of Pure and Applied Chemistry (IUPAC)

www.iupac.org/publications/ci

Managing Editor: Fabienne Meyers
Production Editor: Chris Brouwer
Design: CB Communications

All correspondence to be addressed to:
Fabienne Meyers
IUPAC, c/o Department of Chemistry
Boston University
Metcalf Center for Science and Engineering
590 Commonwealth Ave.
Boston, MA 02215, USA

E-mail: edit.ci@iupac.org
Phone: +1 617 358 0410
Fax: +1 617 353 6466

Printed by:
Cadmus Professional Communications,
Easton, MD USA

Subscriptions
Six issues of *Chemistry International* (ISSN 0193-6484) will be published bimonthly in 2005 (one volume per annum) in January, March, May, July, September, and November. The 2005 subscription rate is USD 99.00 for organizations and USD 45.00 for individuals. Subscription orders may be placed directly with the IUPAC Secretariat. Affiliate Members receive *CI* as part of their Membership subscription, and Members of IUPAC bodies receive *CI* free of charge.

Periodicals postage paid at Durham, NC 27709-9990 and additional mailing offices. POSTMASTER: Send address changes to *Chemistry International*, IUPAC Secretariat, PO Box 13757, Research Triangle Park, NC 27709-3757, USA.

ISSN 0193-6484

From the Editor

If you were to visit the IUPAC Secretariat and walk down the hallway, you would see 85 years of the Union history: portraits of all the presidents who served the Union since 1919. The very first president, a French gentleman, Charles Moreau, is portrayed in a most formal suit and with the seriousness of the 1920s. Overall, about 30 portraits are lined up, with each subject displaying a facial expression that was a sign of their time. All the photos, even the most recent ones, are black and white, and all portray men who chose to carry out the mission of the Union.

Then there is another series of frames that portray the succession of division presidents. Probably no less than 100 photos, post-card size, are displayed. The second frame has something different . . . and here it is, the first woman division president: Mary Good, who served as president of the Inorganic Chemistry Division from 1981 to 1985. She also later served as an elected member of the Bureau and the Executive Committee. Good was first in a number of other ways. She was the first woman to serve on the U.S. National Science Board after being appointed by Presidents Carter and Reagan. In 1997, Good became the first woman to receive the Priestley Medal, the highest honor given by the American Chemical Society.

As one glances at the other frames, only one more occurrence of a woman division president can be found: Irina Beletskaya served as president of the Organic Chemistry Division from 1989 to 1991. Beletskaya graduated from Moscow State University and has served there her entire career. Since 1992, she has been a full member of the Russian Academy of Science.

These portraits are simply a reflection of our history, and here is not the place to debate gender representation in the organization. However, if you are tickled by signs of change, look no further than page 17 in this issue. For the first time in IUPAC history, no less than four women appear on the election ballot for the IUPAC Bureau, including two for the position of vice president. As I have come to grasp, changes in IUPAC usually happen slowly; but when they do, they do for sure. As the baton is passed to younger scientists, we should hope that the issue of gender will never take precedence over one's expertise and willingness to work as a volunteer for an organization such as IUPAC.

Fabienne Meyers
fabienne@iupac.org
www.iupac.org/publications/ci

Cover: Opening ceremony of the 36th International Chemistry Olympiad, the world's most prestigious chemistry competition, held 19 July 2004 in Christian Albrechts University lecture hall in Kiel, Germany. The event attracted 240 upper school students from a total of 61 countries, plus observers from seven countries—never before has the Olympiad enjoyed such an enthusiastic response. (Top photo: Copyright 2004 Stefan Polte, Schwedeneck, Germany.)

Contents

CHEMISTRY International July-August 2005 Volume 27 No. 4

Assessing the IUPAC Project System

by Bryan R. Henry

This year, the focus of my Vice President's Critical Assessment (VPCA) is a review and analysis of our project system. This project system lies at the very heart of IUPAC activities and involves the volunteer efforts of close to 1000 scientists worldwide. It is nurtured, monitored, and organized by IUPAC's eight scientific divisions, and by its standing committees. The range of projects covers the whole gamut of chemistry from chemical education, critically evaluated databases, and precise and reliable atomic weights, to the political arenas of chemical disarmament, sustainable development, meeting the needs of developing countries, the requirements of chemical industry, and a plethora of other areas.

The project system was fully phased in within the 2002–03 biennium. Three years have passed, and it appears that the project system is functioning very well, perhaps even better than expected. This report is based on information obtained from visits and interactions with the various divisions and standing committees. On the basis of these data, the VPCA attempts to provide an overview, to identify best practices, and to address a number of project-related questions. I also touch on a number of other areas of current importance to IUPAC.

. . . it appears that the project system is functioning very well, perhaps even better than expected.

A series of tables within the report provide an overview of the current project system. The number of projects has decreased as we moved away from a commission-based system. A number of projects were abandoned in the 1998–99 and 2000–01 biennia. These were primarily projects initiated under the commission system and not reviewed under the new system. Since January 2002, very few projects have been abandoned. The number of proposals submitted appears to be approximately constant from the 2000–01 to the 2002–03 and to the 2004–05 biennia. One of the difficulties that has persisted from the commission system is the time required for project completion, and the number of projects that do not meet intended completion dates.

There was a significant increase in the total funds devoted to IUPAC projects as we moved from the transition years of 2000–01 to the first years of the project mode in 2002–03. The funds for projects grew from USD 376 350 to USD 622 472, an increase of 65%. Based on the figures for 2004, we appear to be maintaining this level of funding for the 2004–05 biennium. Thus, the promise that was made upon the introduction of the project system appears to have been kept! Savings from the shift to the project mode are being passed on to scientific endeavors. The net result has been a marked increase in the average grant per project.

The VPCA presents a summary set of close to 20 observations and challenges concerning the project system. Several divisions have made a very successful transition to the new system, and the observations identify what is currently working well. On the basis of these observations, the final section lists a series of four recommendations directed towards project generation, project monitoring, project administration, and project activity in the standing committees. An additional recommendation is to achieve a consensus on how future increases in division/standing committee project funding can be tied to success within the project system.

Five additional observations focus on several other issues that relate to the profile of IUPAC, and its role in interactions with industry and with society. These observations form the basis for one final recommendation directed to an even greater role for IUPAC in helping to solve today's global problems.

The VPCA owes a great deal to a number of people. In particular I would like to thank the division presidents and standing committee chairs for their openness, kindness, and hospitality. The VPCA will be presented to the IUPAC Council at its session in August, and the full text will then be available on the IUPAC Web site.

Bryan Henry <chmhenry@uoguelph.ca> is currently IUPAC vice president. He is a professor of chemistry at the Department of Chemistry and Biochemistry at the University of Guelph, Canada. He has been a member of the Canadian National Committee for IUPAC since 1995, and served as chair from 1998–2003.

www.iupac.org/news/archives/2005/vpca_henry.html

The International Chemistry Olympiad

by Jan Apotheker

The International Chemistry Olympiad (IChO)—a chemistry competition for secondary-school students that began in Czechoslovakia in 1968—continues to grow in size, prestige, complexity, and cost. Teams from a record 68 countries will compete at the 37th International Chemistry Olympiad, which will be held 16–25 July 2005 in Taipei, Taiwan.

The IChO tests students' ability to solve challenging chemical problems by designing and conducting their own experiments. The Olympiads also encourage cooperation, understanding, and friendship among young people from different countries.

The following description of the 36th IChO provides an in-depth look at how these events are organized and managed, including the benefits and challenges for the host country.

Opening ceremony of the 36th International Chemistry Olympiad, held 19 July 2004 in Kiel, Germany.

On 18 July 2004, about 250 students from 61 countries descended on the University of Kiel, Germany, to participate in the 36th IChO. The students, who were accompanied by about 200 mentors, observers, and guests, were received by a team from the Institute for Pedagogy of Science, which had worked for about two years to prepare for this meeting.

The team, which was co-chaired by Reiner Demuth, Wolfgand Bünder, and Wolfgang Hampe, had to arrange for housing, transporting, and feeding about 600 people for 10 days. In addition, a committee of scientists from several universities worked for about a year to prepare a practical examination as well as a theoretical examination.

The exam committees are usually comprised of professors from different specialities and different universities, which means there is a great deal of creative power behind the problems the students encounter. Usually, the exam problems are related in some way to the host country. In addition, the scientific committees are often chaired by a renowned chemist.

The scientific committee normally introduces a subject that is relevant to the organizing country: Denmark (2000) had the Øresund Bridge that connects Denmark and Sweden, India (2001) had the iron pole in New Delhi, and The Netherlands (2002) had the Delfts Blue.

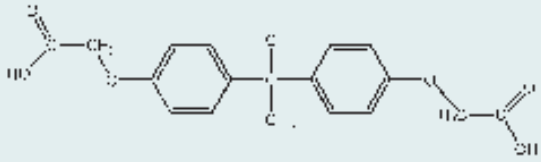
Exam questions for the 32nd IChO—held in Copenhagen, Denmark in July 2000—were related to the Øresund Bridge between Denmark and Sweden.

The theoretical problems on the exams usually involve an array of subjects: physical chemistry, organic chemistry, inorganic chemistry, biochemistry, and theoretical chemistry. Because the range of subjects is so large, the organizing country publishes a set of preparatory problems—both practical and theoretical—on its Web site the previous January. These problems cover all subjects that will be part of the exams. The Web sites for each IChO can be located through the Web site of the international secretariat of the IChO <www.icho.sk>.

The practical exam usually has a synthesis, a quantitative analysis, and a kinetic experiment. For the exam in Kiel, the scientific committee chose to have both a qualitative and a quantitative analysis. The students had five hours to perform the experiments, which meant that they had to plan their work carefully. They are tested on both their ability to perform experiments accurately and on their time management skills. They are given some theoretical questions concerning the experiments, but these are primarily calculations and questions about the interpretation of data.

The exam committee limits the difficulty of the chemistry somewhat since the students are at the secondary school level. However, one may expect a bit more from them. The exam scores these students achieve are consistently surprising. The maximum score on an IChO exam is 100 points, but a normal first year chemistry student would score about 35 points. Usually, the mentors themselves don't score much more than 50 to 60 points. The maximum score of the students in Kiel was 96 points, which is extraordinary.

Synthesis of 2,2- Bis(*p*-phenyleneoxyacetic acid)propane



During the practical exam at the 36th IChO, participants were asked to perform a two-step reaction resulting in the synthesis of this compound more commonly known as bisphenol A bis(carboxymethyl) ether.
Practical exam, 36th IChO <www.icho.de>

The students who score in the top 10% receive a gold medal, the next 20% receive a silver medal, while the next 30% receive a bronze medal. So, 60% of the participants receive a medal. The cut off for the medal allocation is decided by a jury comprised of the mentors.

Although some recent Nobel Prize winners had once been participants in the sister event, the Physics Olympiad, the IChO is more than just a competition to determine the best chemistry students of the year. These events are the first time that these students meet fellow students interested in the same subject. They get to know each other well, make a lot of friends, and get to tour the host country.

For most students, the IChO is the first step in a series of meetings with their peers. Usually it is also their first experience with a different culture. For some participants, it creates an opening for a university education. For example, participants from The Netherlands receive an extra grant when they start studying chemistry.

The Olympiad program is very busy, especially for the mentors. They start by inspecting the labs after the official opening. The program for a typical IChO is given in the table to the right.

During the first Olympiads, the authors of the exams were given the task of translating them into the native language of the participants. Nowadays, this is the task of the mentors. Up until the 2000 IChO in Copenhagen, the mentors translated the exams at night, sometimes not finishing until around 7 AM the next morning. In 2002 in Groningen, it was the first time that a separate day was provided for the translations. Even the English speaking nations feel a need for translation, but usually they are the first to finish!

Typical Olympiad Program

day	students	mentors/ observers	guests
1	arrival		
	welcome party		
2	official opening	official opening	official opening
	excursion/get together	lab inspection jury session 1	excursion
3	excursion	translation	excursion
4	practical examination	excursion	
		jury session 2	
5	excursion	translation	
6	theoretical exam	excursion	
7	excursion	grading jury business meeting	excursion
8	excursion	arbitration jury session medal allocation	excursion
9	closing session and party		
10	departure		

The mentors also form the jury of the Olympiad and they decide on the final text version of the exams. This sometimes leads to heated discussions and long jury sessions. The evenings and excursions are used to teach the mentors about the host country and to exchange ideas about chemistry education. It has become a tradition for mentors to exchange national exam problems, which allows each mentor to build up a large file of suitable problems.

The Olympiad is an event that takes a lot of energy, but also creates a lot of new ideas and energy for the participants. It also provides stimulus to chemistry education in the home country of participants. Students who participate receive extra attention and have better opportunities for a university education. The teachers involved in the national committees for the IChO gain a better understanding of the level of chemistry education in their

During the 34th Olympiad, one excursion was a visit to the Rijksmuseum in Amsterdam, where the students were exposed to a generous portion of Rembrandt and Hals.

country. University professors who are involved with the Olympiads are able to get in touch with talented students interested in chemistry.

The IChOs also present some challenges. A number of countries are having difficulty with travel expenses. Participation in the IChO is relatively cheap, between USD 100 to a maximum USD 2000, depending on the number of years participating. Travel, however, is a different matter. A number of countries—for example from South America and Africa—have had problems raising the funds required.

Despite these difficulties, the number of participating countries has risen steadily during recent years. In Kiel, 61 countries participated, while 7 observed. The number of countries participating in Taiwan will be more than triple the 20 that participated in 1984 in Frankfurt, Germany.

Most European countries and quite a few Asian countries participate in the IChO. From Africa, only Egypt is participating. Kenya, Ivory Coast, and Nigeria have sent observers but are not yet ready to participate. For countries in Africa and a number of countries of the former Soviet Union, participating in the Olympiad creates financial problems. IUPAC and UNEP (United Nations Environment Programme) have indicated that they are willing to help find financial support, but these problems remain to be addressed. Talented chemistry students from these countries, in particular, could benefit immensely from the IChO.

Hosts of the IChO (*in 1971 the Olympiad was not held*)

Year	Place	Year	Place	Year	Place
1968	Praque, Czechoslovakia	1981	Burgas, Bulgaria	1993	Perugia, Italy
1969	Katowice, Poland	1982	Stockholm, Sweden	1994	Oslo, Norway
1970	Budapest, Hungary	1983	Timisoara, Romania	1995	Beijing, China
1972	Moscow, Soviet Union	1984	Frankfurt, West Germany	1996	Moscow, Russian Federation
1973	Sofia, Bulgaria	1985	Bratislava, Czechoslovakia	1997	Montreal, Canada
1974	Bucharest, Romania	1986	Leiden, The Netherlands	1998	Melbourne, Australia
1975	Veszprém, Hungary	1987	Veszprém, Hungary	1999	Bangkok, Thailand
1976	Halle, East Germany	1988	Espoo, Finland	2000	Copenhagen, Denmark
1977	Bratislava, Czechoslovakia	1989	Halle, East Germany	2001	Mumbay, India
1978	Torun, Poland	1990	Paris, France	2002	Groningen, the Netherlands
1979	Leningrad, Soviet Union	1991	Lodz, Poland	2003	Athens, Greece
1980	Linz, Austria	1992	Pittsburgh, USA	2004	Kiel, Germany

Origins of the Olympiad

It was in 1968 that the idea of an international Olympiad emerged from the former Czechoslovakia. Supported by the Ministry of Education, the Czechoslovak National Committee for the Chemistry Olympiad sent out invitation letters, to which Poland and Hungary responded. That year in June, these three countries participated in a four-day competition held in Prague. Each team had six pupils. There were four theoretical tasks and no experimental tasks.

At the second Olympiad, held in 1969 in Katowice, Poland, a five-day competition took place with four teams of five pupils each. The fourth team came from Bulgaria, while the former East Germany and Soviet Union sent observers. The competition included experimental tasks in addition to the theoretical tasks.

The Olympiad grew quickly, and included 7 countries in 1970 (plus former East Germany, Romania, Soviet Union); 9 countries in 1974 (plus Sweden and Yugoslavia); and 12 in 1975 (plus Austria, former West Germany, Belgium). In 1980, the Olympiad was held for the first time in a so-called "capitalist country," which was Austria. With the growing numbers of participants, a permanent secretariat was established in 1982.

The host country carries most of the cost of organizing the Olympiad. As the number of participants grows, the budget for organizing each event is rising too. At the moment, it is around USD 1.5 million. Until 2010, the steering committee has found countries that are willing to host the Olympiad: In 2006 it will be in Seoul, 2007 in Latvia, 2008 in Hungary, and in 2009 it will possibly be in the UK. The future is looking good for the Olympiad!

Jan Apotheker <J.H.Apotheker@rug.nl> is a professor at the Institute for Mathematics and Science Education at the University of Groningen, in The Netherlands. Apotheker was chairman of the Organizing Committee for the 2002 IChO.

www.icho.sk

Public Images of Chemistry

by Nicole J. Moreau

Majorities of people in many parts of the world hold negative opinions of chemistry and the chemical industry in particular. Enhancing the public understanding of chemistry is a major concern for IUPAC and many other organizations around the world. But a necessary precursor to improving perceptions about chemistry is understanding why, how, and from where people form their opinions about chemistry.

A pathbreaking conference held in Paris from 17–18 September 2004 explored the images and messages that people receive about chemistry from a variety of media: literature, advertising, the news, movies, cartoons, and exhibitions. The conference, titled **The Public Images of Chemistry in the 20th Century**, investigated how these portrayals affect public perceptions of chemistry and how chemists present themselves to the public.

The conference began with a reality check of public opinions in Europe. The consensus was that opinions about chemistry varied widely across different countries, but that overall opinions across Europe were improving slightly. Alain Coine from Rhodia (France) stated that more than 65% of the French public has a bad image of its chemical industry. He said that this is the worst view in Europe after Sweden, where 80% hold a negative view. More specifically, Coine pointed out, 40% of French people do not think that their standard of living would decrease if there were no chemical industry, 63% do not think that the chemical industry makes efforts to decrease risks to the public, and only 55% feel that it makes efforts to protect its employees.

Marc Devisscher from CEFIC (the European Chemical Industry Council, Belgium) gave an overview of public opinion in Europe over the past 12 years. For the first time since 1992, the overall image of chemistry among Europeans is positive (see figure 1), and after years of decline, the position among eight benchmark industries has improved by one rank from 7 to 6 (see figure 2). However, Devisscher stated, the chemical industry's reputation is still not good enough and there is room for improvement. For example, he pointed out, the highest approval rating in Europe is only 62% (in Germany and Italy).

So, how has the portrayal of chemists in books, movies, and popular culture contributed to public distrust and suspicion? Rosslyn D. Haynes (Sydney, Australia) and Philip Ball (UK) examined the treatment of chemists and chemistry in literature.

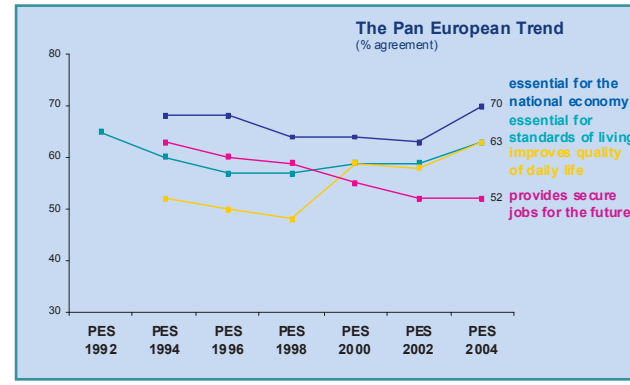


Figure 1: The overall image of chemistry is improving in Europe. (CEFIC Pan European Survey—Image of the Chemical Industry 2004).

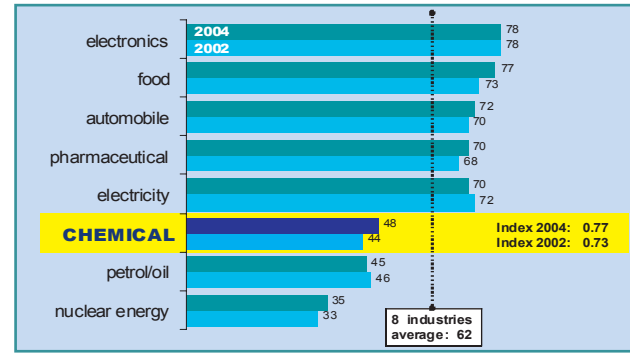


Figure 2: Opinions about the chemical industry are also improving. (CEFIC Pan European Survey—Image of the Chemical Industry 2004).

Ball explained that many twentieth-century novels explore ideas in contemporary physics and biology, but chemistry is much harder to find, beyond the occasional use of chemical poisons in murder mysteries. However, Ball stated, a clutch of novels by modern American writers tell another tale: they portray chemistry as a pervasive aspect of contemporary life, providing the smells, colors, textures, and tastes of everyday experience. Ball discussed three books in particular—*Gravity's Rainbow* by Thomas Pynchon, *White Noise* by Don DeLillo, and *Gain* by Richard Powers—and said they seem to display a love-hate relationship with the discipline, portraying chemical science both as an essential and inescapable element of modernity and as an ominous, potentially dangerous force in industrialized society.

Haynes argued that portrayals of chemistry in literature often rely on the old archetype of alchemists: sinister, dangerous, secretive, and possibly mad. This archetype can appear simplistic, even outdated, but its recurrence suggests that it embodies complex ideas, desires, and fears that each generation must work through. According to Haynes, this archetype has endured because of our obsession with power, perfection, and horror. This is why, she stated, that despite all the beneficial outcomes of chemistry, fiction, film, journalism, and the media continue to focus on disastrous consequences.

Peter Weingart (Bielefled, Germany) discussed his quantitative analysis of how chemistry and other sciences were portrayed in 222 movies made between 1920 and 2001. He found that the representation of science and scientists reflects stereotypes and myths about science that are deep seated in Western culture. According to Weingart, when movies portray wrongdoing or misconduct by a scientist, it is frequently a chemist that is being portrayed. In the case of horror movies, he said, chemists were cast as evildoers in 24% of such films, while other types of scientists accounted for less than 10%.

Opinions about chemistry are also formed through still photographs or graphics as Joachim Schummer (Columbia, USA) and Tami Spector (San Francisco, CA, USA) showed in their lecture. They discussed the public image of chemistry and chemists as codified in clip-art cartoons and in digital images found through Internet searches. Their analysis of clip-art cartoons demonstrated chemistry's principle role as a visual indicator for science and its stereotypical associations, while their detailed analysis of photographs showed a more nuanced assessment of chemistry's visual image. According to Schummer and Spector, "mad scientists" portrayed in their cartoons are chemists 50% of the time. Whereas images of physicists were dominated by famous scientists, the chemist was often represented as an unknown, unshaved, and unkempt old bearded man wearing a white jacket and glasses, working in a laboratory. Such images, they said, reinforce the idea of chemists as isolated people, asocial, mad scientists, or alchemists.

Another lecturer traced America's ambivalent involvement with plastic and how this has shaped public perceptions of chemistry. Focusing mostly on the post-World War II period, Jeffrey Meikle (Austin, TX, USA) explored the strategies used by manufacturers and promoters to gain public acceptance for plastic and discussed the symbolic hold of plastic on the popular imagination. He showed how America's enthusiasm for everything plastic—and by extension chemistry—has been complicated by environmental doubts and by the plasticity of the postmodern existence.

Anxiety or fear about chemistry can also be traced to how it is taught in school, according to R. Emmanuel Eastes (Paris, France). In his lecture, Eastes asked, "Which child does not dream of a chemistry kit or of a real chemist's classroom visit? Who never tried, in the secrecy provided by temporary parental absence, to mix food or household chemicals in order to transform them, sometimes even harboring the secret desire to see them 'blow up'?" Yet, Eastes said, if you ask their parents or their neighbors what they think of chemistry, they will invariably say: "I always hated it," or "I never understood it."

Anxiety or fear about chemistry can also be traced to how it is taught in school . . .

What happened between childhood and adulthood? asked Eastes. What repercussions does such a dislike bring, on the one hand, for the image of our discipline among laypersons, and on the other, for the phenomenon of disaffection with chemistry studies at the university level? Without condemning school curricula, Eastes showed that between "disconnected spectacle science" and "theoretical coded discipline," chemistry's image suffers from the disequilibrium between (1) the pleasures of practical experimentation, (2) the hardship of formal learning, and (3) students' own questionings.

Valuable lessons on making chemistry education interesting were provided by Robert Hicks (Philadelphia, PA, USA), who discussed the Chemical Heritage Foundation's interpretive outreach effort, *Science Alive!* This Web-based program teaches science through a historical presentation that combines biography, a narrative structure, and science activities. According to Hicks, *Science Alive!* intends to realize national (USA) educational standards concerning the history and nature of science, standards usually ignored or minimized in most curricula.

Broadly consistent with national standards, *Science Alive!* teaches that science is a human endeavor that relies on acute observation of nature, an essential curiosity, cooperation and collaboration, and a disciplined process of reasoning, inquiry, and analysis. What distinguishes *Science Alive!* from other science educational resources, said Hicks, is the emphasis on

the history and heritage of chemistry and the molecular sciences, and the program's multicontextual, multidisciplinary perspective.

The pilot project for *Science Alive!* focuses on the life and work of African-American chemist Percy Lavon Julian (1899–1975). The grandson of slaves in Alabama, Julian sought a career in chemistry, which took him to the University of Vienna (Austria) to obtain a doctorate before World War II, and to a lifetime of research based on plant products such as soy and the calabar bean. Julian's work led to the synthesis of physostigmine (esserine), for the treatment of glaucoma, the bulk synthesis of progesterone, testosterone, and cortisone, and during the war a flame retardant, Aerofoam, which saved lives aboard aircraft carriers. Julian held more than 150 chemical patents, and his career included the founding in 1953 of his own successful company, Julian Laboratories, and later Julian Associates, Inc. and the Julian Research Institute.

While education plays a major role in forming opinions about chemistry, advertising, news coverage, and social movements can strongly shape ideas throughout an individual's life. David Rhees (The Bakken Library and Museum, USA), director of the science library in Minneapolis, discussed how the public image of chemistry in the 20th century was significantly shaped by corporate needs and modern public relations techniques. He talked about how the "Better Things for Better Living . . . Through Chemistry" slogan came to epitomize the public image of chemistry in the United States for generations.

According to Rhees, the DuPont Company invented this slogan in response to a major public relations crisis that stemmed from its role as a munitions producer during World War I. This crisis, in which DuPont was branded as a "merchant of death" in the public press in 1934, triggered more than a slogan, but gave rise to a broad-based advertising campaign that utilized a wide variety of educational and popular media. These techniques included sponsorship of a national radio show, films, pamphlets, a speaker's bureau, and a remarkable series of exhibitions on the theme of the "Wonder World of Chemistry" which appeared at major science museums and state and world's fairs. To design, execute, and evaluate this campaign, DuPont relied on a bevy of new experts including industrial designers, public relations counselors, and even psychologists. However, DuPont dropped the tag line "through chemistry" in the 1980s, perhaps because of the declining image of the field.

The impact of media coverage and the opinions of other scientists were explored by Guy Ourrisson of the French Académie des Sciences. Specifically, he discussed the "Appel de Paris," a 10-page document released at a well-attended meeting on "Cancer, Environment, and Society" held 7 May 2004 in the UNESCO building in Paris. As Ourrisson explained, the document, which received media coverage, denounces the dangers for human health of chemical pollution. The Appel has been signed by many well-known scientists, and has been distributed by many organizations—such as Greenpeace and consumers' associations—which encourage people to sign the Appel.

According to Ourrisson, the Appel is constructed in a very clever way, since it begins with a long list of undisputable statements, to which anyone is bound to subscribe, concerning the Rights of Man, the Protocols of Rio, Stockholm, Kyoto, etc. What follows is somewhat different, he said, since it is a series of scientific considerations, which are indictments of chemical pollution for all kind of diseases and the disappearance of biodiversity—all being a consequence of the irresponsible behavior of chemists and of the chemical industry.

Ourrisson then answered to each of the 15 points in the Appel, estimating that even the affirmations which were not simply false, were presented in a tendentious way, leading to undue blame and nefarious actions against chemists. He pointed out that no allusion can be found in the Appel concerning the irresponsible behaviors of consumers. Furthermore, he argued, chemists are not responsible for tobacco use, fine particle emissions by cars, naturally occurring toxins in the environment, or the use of illicit drugs.

The public has a very traditional image of chemistry, Paul Caro

(Académie des Technologies, France) explained. Hence, there is a need to show people that it is a central science. However, he said, it is very difficult to explain to the public what your fellow chemist does not understand! Although the wide array of new techniques used by the chemist is an enlargement of his capacities and offers a deeper view on matter, there is a perverse effect. As chemists enter more deeply the mysteries of their specialities, the communication lines with fellow chemists in other specialities are cut and isolation, perhaps incomprehension, may result. He argued there is a need for chemists to learn and teach across the full spectrum of chemistry, even in a superficial way, to be able to understand each other and to help popularize chemistry.

The increased specialization of chemistry and the intricate languages developed for each field further distanced the public from chemistry, according to Pierre Laszlo (France). During the second half of the twentieth century, he stated, the self-image of the chemical profession was determined to a large extent by a symbiotic relationship between the science and the industry. Until the 1980s, chemistry's joint roots with pharmacy continued to be strong and mutually nourishing, he noted. Chemists veiled to themselves the cyclical character of the industry with an ideology of growth—exponential growth being viewed as excellent. The existence of a language of chemistry, which its practitioners had taken years to master, was held as a prerequisite to any communication, which ran against popularizing rudiments of the science (or of the industry). Hence, Laszlo argued, chemophobia was able to feed on industrial accidents (Seveso, Basel, Bhopal) and on the spectacular expansion of the chemosphere during that period.

Nicole J. Moreau <nicole.moreau@enscp.jussieu.fr> is a professor at the Chemical Sciences Department of the CNRS (Centre National de la Recherche Scientifique) in Paris, France.

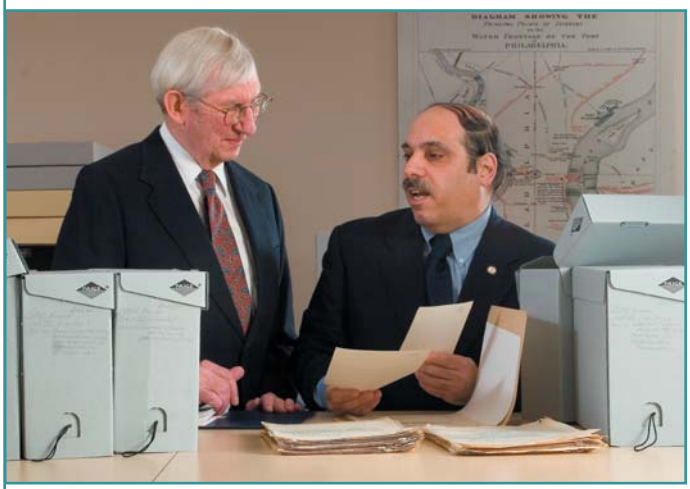
www.hyle.org/service/chmc2004

Processing Addenda to the Records of IUPAC

by Andrew Mangravite

The Chemical Heritage Foundation's (CHF's) collection represents the material culture of the chemical and molecular sciences, technologies, and industries. Included in the collection are chemical instruments and apparatus, historical artifacts, organizational and personal archives, memorabilia, and works of art relating to the history of chemistry. Every new collection that CHF processes presents challenges unique to that collection. In general, organizational records, such as those of IUPAC, are thought to be easier to process because they possess a preexisting and functional order. Archivists have long regarded this internal order as sacrosanct—the one reliable guide to the raison d'etre of the records.

CHF recently completed the processing of IUPAC's records from 1965 to about 1995 (referred to hereafter as the IUPAC Addenda). CHF had already received and processed an earlier accretion of IUPAC records covering the period 1919 to about 1965. The more recent records had been boxed at the Secretariat's offices when they were in Oxford, UK, and shipped to Philadelphia, Pennsylvania, USA. The boxes containing the records were sequentially numbered, which should have made for a relatively easy unpacking job.



Former IUPAC Secretary General Ted Becker (1996–2003) and Andrew Mangravite (CHF archivist) reviewing IUPAC historical documents preserved by the Chemical Heritage Foundation.

Unfortunately, there was a queue for processing collections and by the time the IUPAC Addenda were reached, that original sequential order was long gone—the casualty of several on-site moves and a period of off-site storage.

The first order of business then was to reconstruct the shipping order. The off-site storage facility had utilized pallets and no attempt had been made to preserve the numerical order of the boxes. This meant that the pallets had to be emptied one by one and, after determining that the original sequential order was in fact gone, the boxes were opened and their contents shelved. A number of factors kept the process from collapsing into chaos. The records had been stored in relatively sturdy document boxes with their contents identified on the spine of the boxes, so it was feasible to treat them as "big books." In addition, the original shipping list had been preserved, which served as the guide to recreating the internal order of the collection. Also, whenever possible during the unpacking phase, like was grouped with like, so that Analytical Chemistry Division records were kept on one section of shelving, Clinical Chemistry Division on another, and Executive Committee on yet another. Once they were unpacked, the records occupied six entire rows of shelving in the temporary storage area. Access to so much empty shelving—not a normal occurrence—was the third factor that allowed this large amount of material (300 cubic feet on pallets) to be successfully sorted.

Once the cartons were emptied and the document boxes shelved, the actual processing began. The shipping list revealed that the files had been prepared for shipment in their organizational order beginning with the Council records, then proceeding to the Bureau, the Executive Committee, and so on. Broadly speaking, the first portion of the addenda cover administrative functions of IUPAC, while the latter parts contain the records of the various divisions and are more science oriented.

Within the administrative records, one sub-series of the files labeled "Executive Secretary files" turned out to be a key to gaining intellectual control over the administrative side of the collection. (The very size and complexity of the collection made the establishment of intellectual control a daunting task, especially for an "outsider.") Part of the IUPAC Executive Secretary's job was to compile loose-leaf binder "digests" of pertinent information for Council, Bureau, and Executive Committee meetings. These digests survive for the

period 1961 to 1989 and serve as excellent guides to exactly what was on IUPAC's mind. They provide an excellent starting point for scholars interested in unraveling the Union's inner workings and help pinpoint the development of administrative trends.

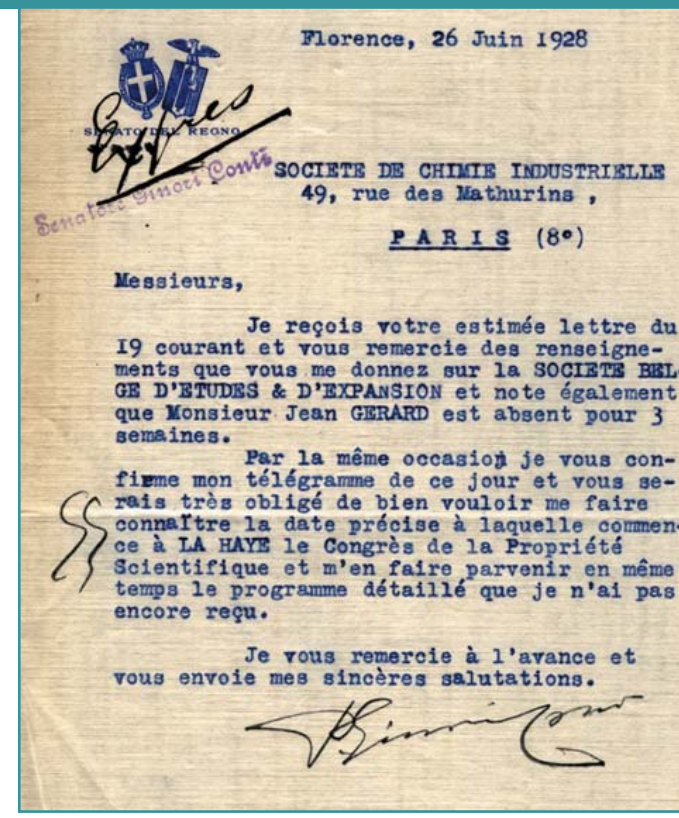
The Physical Condition of the Collection

Although some of the letter boxes had been banged about a bit, the contents were, for the most part in excellent condition (with one exception that is explained below). One aspect of the physical processing of a document collection is the removal of metallic paper clips and staples. As you can well imagine, in almost 50 years of activity, IUPAC's various office staffs generated tens of thousands of staples, and these had to be removed. The fact that many of the documents were file copies on a very thin paper complicated the matter. Staples had to be carefully pried open and removed, then replaced with archival-quality plastic clips.

On a more serious note, the Archives of the Committee on Teaching of Chemistry had apparently been salvaged from a fire at some point. Aside from being left in unsightly condition, there was also a question of potential contamination from fire-suppressing chemicals. Since education is a major portion of CHF's mission, it was untenable to discard altogether the archival records of a standing committee dedicated to improving the quality of chemical education. After consultation with the senior archivist, a processing strategy was settled upon whereby only the most badly damaged items were discarded outright. Fortunately, these were a very small portion of the whole. Documents that were suspected of contamination were reproduced on archival quality paper with the suspect originals then discarded, while those that were simply unsightly were processed as is.

What to Keep and What to Toss?

For many readers, the term "de-accessioning material" probably calls up images of a crazed archivist sitting next to a mini-dumpster on wheels. The earliest archival theorists—Muller, Feith, Fruin, Jenkinson—were dealing with documents that were hundreds of years old, one-of-a-kind, and irreplaceable. Naturally the notion of anything being expendable was anathema to them, and they theorized accordingly. The modern archivist of a



Florence, 26 Juin 1928

SOCIETE DE CHIMIE INDUSTRIELLE
49, rue des Mathurins ,
PARIS (8e)

Messieurs,

Je reçois votre estimée lettre du 19 courant et vous remercie des renseignements que vous me donnez sur la SOCIETE BELGE D'ETUDES & D'EXPANSION et note également que Monsieur Jean GERARD est absent pour 3 semaines.

Par la même occasion je vous confirme mon télégramme de ce jour et vous serais très obligé de bien vouloir me faire connaître la date précise à laquelle commence à LA HAYE le Congrès de la Propriété Scientifique et m'en faire parvenir en même temps le programme détaillé que je n'ai pas encore reçu.

Je vous remercie à l'avance et vous envoie mes sincères salutations.

Among the items discovered in the IUPAC archives was a letter signed by Prince P. Ginori-Conti, an early experimenter in the field of thermodynamic chemistry, and as it turned out, also chairman of the IUPAC Finance Committee during the 1920s and 1930s.

contemporary, or even a near-contemporary administrative collection, is dealing with a paper avalanche. Everything cannot be saved, and the scholars who use CHF's collections would not want everything to be saved. An "editing" process must take place, whereby the information is packed and put into an accessible-form. This is the "value-added" aspect of archival processing, without which, the job could be done by an idiot-savant who happens to be good at removing staples. But at the end of processing, the greater part of most collections, and certainly the greater part of the IUPAC records, are preserved. If a document was significant it was saved. If a document was not in itself significant but contributed to the overall "story" of the collection, it was saved. Correspondence on seemingly trivial matters frequently allows us to preserve "the administrative mindset" of the organization from which it was created.

Once the Division files were processed, it became apparent that CHF now possessed a veritable "chemical reference encyclopedia." This was because IUPAC concerned itself with all aspects of chemistry and the

divisions tried to keep abreast of all current developments. Familiar patterns emerged: the tug of war between theoretical and applied chemistry, the emergence of transformative technologies that frequently shifted the focus of entire divisional subcommittees and commissions (as when the relatively mundane Fermentation Industries Section of the Applied Chemistry Division was transformed into the Biotechnology Commission).

Although it initially appeared that this material would be relatively "new" (1965 onward), it was discovered that the latter portions of the collection, dealing with such topics as National Adhering Organizations and "general files" often contained much older material than was anticipated. For instance, a letter box marked "To be sorted," contained press clippings from a 1956 conference, but beneath that, were records of the Finance Committee going back to the earliest years of IUPAC. These were actually saved because the contents smelled older than 1956 and a quick shuffle through them disclosed the signature of Prince P. Ginori-Conti, an early experimenter in the field of thermodynamic chemistry. (With the volume of papers that needed to be evaluated, the "10-second rule" had to be invoked and frequently a random phrase, a familiar-sounding name, or a florid signature was all that stood between a more careful evaluation and the discard pile.)

The recent addenda to the IUPAC Archives covers the period when Dr. Mo Williams served as executive secretary. He is pictured holding a silver salver presented to him in August 1997 after 29 years of service. The salver is engraved with the signatures of the 15 IUPAC presidents under whom he served.

As a result of these "lost" files being found, CHF has an almost unbroken series of records from the Finance Committee, including those covering the very trying years of the Great Depression. Clearly, gaps remain in the records of IUPAC, and the contents of the main collection dealing with the formative years is much spottier than the addenda, but it seems safe to say that a significant portion of the achievements of a remarkable organization have been saved, preserved, and made accessible to scholars for generations to come.

Andrew Mangravite <andrewm@chemheritage.org> is processing archivist at the Chemical Heritage Foundation, in Philadelphia, Pennsylvania, USA, and is particularly engaged in the "IUPAC project."

The Chemical Heritage Foundation is an Associated Organization of IUPAC. It serves the community of the chemical and molecular sciences, and the wider public, by treasuring the past, educating the present, and inspiring the future. <www.chemheritage.org>

Freedom to Publish

by Wendy Warr

In the Land of the Free it seems that free speech is not as free as we may have thought. As I write, it is still not clear whether publishers are free from government interference if they wish to edit and publish articles or books written by authors from certain countries that are subject to trade sanctions. The sorry saga began when the Institute of Electrical and Electronics Engineers (IEEE) ran a conference in Iran a few years ago. Money transfer was a problem and IEEE had dealings with the U.S. Treasury Department's Office of Foreign Assets Control (OFAC). Later, OFAC started to look at IEEE's publishing operations and, in late September 2003, issued a ruling indicating that copy editing of learned articles from trade-embargoed countries (Cuba, Iran, Iraq, Libya, and Sudan) might be affected. IEEE applied for a special license to publish in October 2003, but most other publishers continued with business as usual.

. . . it is still not clear whether publishers are free from government interference . . .

The American Chemical Society (ACS) was warned about this problem by its legal counsel in November 2003, and, as a consequence, ACS felt obliged to declare a moratorium on publishing articles from the trade-embargoed countries. ACS' editors (and many members) were not at all happy with the decision. ACS management was none too happy either, but the moratorium was considered prudent since civil and criminal penalties could have been very high. The moratorium was always intended to be a temporary expedient and in mid-February 2004, ACS took a courageous decision to lift the embargo, leading the *Los Angeles Times* to applaud ACS as a "defiant publisher."

At the beginning of April 2004, OFAC ruled that scientific publishers can continue to peer review, edit, and publish papers submitted by authors in countries under U.S. trade embargoes. Residual issues however remained. In September, the Professional/Scholarly Publishing Division of the Association of American Publishers (AAP), the Association of American University Presses, PEN American Center (PEN is a society for "poets, playwrights, essayists, editors, and novelists"), and Arcade Publishing asked a New York court to strike down the offending OFAC regulations. The ACS, through its membership in AAP, is participating in the suit and is providing financial backing.

The plaintiffs argue that licenses are not needed because trade legislation passed by Congress exempts informational materials from trade embargoes. They point out that the regulations violate the Trading with the Enemy Act (TWEA), the International Emergency Economic Powers Act (IEEPA), and the First Amendment. TWEA and IEEPA were twice amended by Congress, in the Berman Amendment and the Free Trade in Ideas Amendment, to make it clear that transactions involving "information and informational materials" are exempt from trade embargoes.

Scientific publishers are not the only ones to fall foul of the regulations. Shirin Ebadi, the winner of the 2003 Nobel Peace Prize, an Iranian lawyer and children's advocate, is prevented from publishing her memoirs in the United States because of the OFAC embargo. The embargo was intended to punish repressive governments such as the one in Tehran that sent Ebadi to jail, but it has backfired because she has been denied her right to publish in both Iran and in the United States. Ironically, she would have been free to publish a translation of her book in the United States had it originally been issued in Iran, since the regulations allow publishers to "reproduce, translate, style, and copy edit" existing works from sanctioned countries, but the regulations prohibit providing the editing services that would allow publication of an original book in the United States. Ebadi and her literary agency are suing the U.S. Department of the Treasury.

In what might have seemed to be the final chapter in this ludicrous tale, the U.S. Treasury Department issued revised regulations in December 2004 spelling out that all activities ordinary and incident to publishing are not forbidden, so American publishers do not have to apply for a license if they wish to edit or publish works by authors in Cuba, Iran, or Sudan. The ruling, however, does not mention any other embargoed countries and there are still prohibitions on publishing activities for authors who are defined as part of the "government" of the sanctioned countries.

Moreover, OFAC continues to assert that it has the right to restrict publishing, and so they could reinstate the licensing requirement at any time. Linda Steinman, a lawyer at Davis Wright Tremaine LLP who represents the publishers in the AAP lawsuit, initially called the new regulations "a very, very positive step in the right direction," but as of April 2005 there is no sign of an end to the litigation.

Publishers . . . should not have to go to any government to ask for permission to publish.

I am not qualified to comment on the impact of all this on IUPAC's publishing operations, but I would like to hope that IUPAC will continue to publish without fear or favor. Publishers, whether they be international or American, should not have to go to any government to ask for permission to publish. The right to free speech is a basic liberty we all deserve.

Wendy Warr <wendy@warr.com> is managing consultant at Wendy Warr & Associates <www.warr.com> in the UK. She chaired the IUPAC Committee on Printed and Electronic Publications until the end of 2003.

InChI 1.0 Release

Version 1.0 of IUPAC's International Chemical Identifier (InChI) was released in April 2005. Software, documentation, source code, and licensing conditions are available from the IUPAC Web site at <www.iupac.org/inchi>.

Ultimately, the "identifier" is an unique molecular label. The InChI software generates a different identifier for every different compound, but always gives the same identifier for a particular compound regardless of how the structure is input. InChI is based on an approach that expresses a chemical structure in terms of layers of information (connectivity, tautomeric, isotopic, stereochemical, and electronic). In the final representation, the unique connectivity layer is essential, and the algorithm converts input structural information into the identifier.

For InChI to fulfill its potential, software developers will need to incorporate it into their products. It has already been included as an integral component of Chemical Markup Language <www.xml-cml.org>, and InChI files can be generated easily by using a freely available structure-drawing program. Further developments will ensure that anyone can easily obtain an InChI file at the desktop, or convert an InChI file back into a displayed structure.

Possible applications include ordering chemicals from suppliers, finding compounds in the chemical/patent/general literature via text-based search engines such as Google, communicating between databases, maintaining a laboratory chemical inventory, or passing the "identity" of a substance to a colleague for use in any of the above.

A follow up project, which will promote the use of the Identifier throughout the chemical information community, is being headed by Alan McNaught.

www.iupac.org/news/archives/2005/inchi.html

Samsung Funds IUPAC Programs for Young Chemists

In 2003 the Samsung General Chemicals Co. (presently the Samsung Total Petrochemical Co. Ltd.) of South Korea donated USD 125 000 to the Polymer Division (then the Macromolecular Division) in order to help IUPAC stimulate polymer education and research in the world. This was the very first donation of its kind to IUPAC from industry. According to the agreement between the IUPAC Polymer Division and Samsung, only the interest earned from this endowment may be used for the following four areas:

1. Samsung–IUPAC Young Polymer Scientist Award

The winner of this award is chosen every other year right before the World Polymer Congress (WPC is the major IUPAC biennial conference in the field of macromolecules and polymers) from a pool of recommended candidates who are below age 40. The winner is honored with an award plaque and USD 2000 during the WPC. In July 2004, at the WPC held in Paris, Professor **Timothy Deming** of the University of California at Santa Barbara (USA) was the winner among six finalists.

2. Travel Grant for Students from Economically Disadvantaged Countries

The WPC Organizing Committee is given USD 3000 to help students attend the WPC. At the WPC in 2004, 15 students were selected by the organizing committee and each was given USD 200.

From left, Won Lee (director, Samsung Total Petrochemical Research Center), Robert F.T. Stepto (president, IUPAC Polymer Division), Timothy Deming (recipient of the 2004 Samsung–IUPAC Young Polymer Scientist Award), Jung-Il Jin (vice president, IUPAC Polymer Division), and Jean-Pierre Vairon (chairman, Organizing Committee of WPC 2004).

3. Support of the WPC Organizing Committee

The WPC Organizing Committee is given up to USD 2000 to defray the cost of plenary speakers.

4. Support of Education-Related Projects

One or two polymer education-related projects will be supported by the fund. Arrangements for implementation of this support will be finalized during the Polymer Division Committee at its next meeting at the IUPAC General Assembly this August in Beijing.

The endowment is managed by the Samsung–IUPAC Polymer Division Fund committee whose members are Professor Robert F.T. Stepto (IUPAC Polymer Division president), Dr. William J. Work (Division secretary), Mr. Hong-Sik Ko (president of Samsung Total), and Professor Jung-Il Jin (Division vice president).

2005 IUPAC Prize for Young Chemists

On 25 April 2005, IUPAC announced the winners of the IUPAC Prize for Young Chemists, an award for the best Ph.D. thesis in the chemical sciences as described in a 1000-word essay. The winners are as follows:

- ***Zev Gartner***, Harvard University, Cambridge, Massachusetts, USA
- ***Jiaxing Huang***, University of California, Berkeley, USA
- ***Hiromitsu Maeda***, Kyoto University, Kyoto, Japan
- ***Xun Wang***, Tsinghua University, Beijing, China

The winners will each receive a cash prize of USD 1000 and a free trip to the IUPAC Congress, 14-19 August 2005, Beijing, China. Each prizewinner has been invited to present a poster at the IUPAC Congress describing his/her award winning work and to submit a short critical review on aspects of their research topics to be published in *Pure and Applied Chemistry*.

The essays describing the winners' theses can be found on the IUPAC Web site and cover a wide range of subject matter:

- Dr. Gartner, "The Development of DNA-Templated Organic Synthesis"
- Dr. Huang, "Conducting Polymer Nanofibers: Synthesis, Properties and Applications"
- Dr. Maeda, "Synthesis and Properties of Multiply N-Confused Porphyrins"
- Dr. Wang, "Solution-Based Route to Transitional Metal Oxides One-Dimensional Nanostructures: Synthesis, Characterization, and their Properties"

There were 60 applicants from 22 countries. The Prize Selection Committee was comprised of members of the IUPAC Bureau with a wide range of expertise in chemistry. The committee was chaired by Pieter S. Steyn, IUPAC past president.

In view of the quality of many applications, the committee decided to give four Honorable Mention Awards to the following young chemists:

- Omar Azzaroni, Universidad Nacional de La Plata, Argentina
- Suraj Dhungana, Duke University, Durham, North Carolina, USA
- Rongchao Jin, Northwestern University, Evanston, Illinois, USA
- Young-Wook Jun, Korea Advanced Institute of Science & Technology (KAIST), Daejeon, Korea

The Honorable Mention Award winners will receive a cash prize of USD 100 and a copy of the *Compendium of Chemical Terminology*, the IUPAC "Gold Book." The awards to the winners of the 2004 prize and those of 2005 will be made during the Opening Ceremony of the Congress in Beijing on Sunday 14 August 2005.

Applications for the 2006 Prize are now being solicited, as described on the IUPAC Web site <www.iupac.org/news/prize.html>.

www.iupac.org/news/prize/2005_winners.html

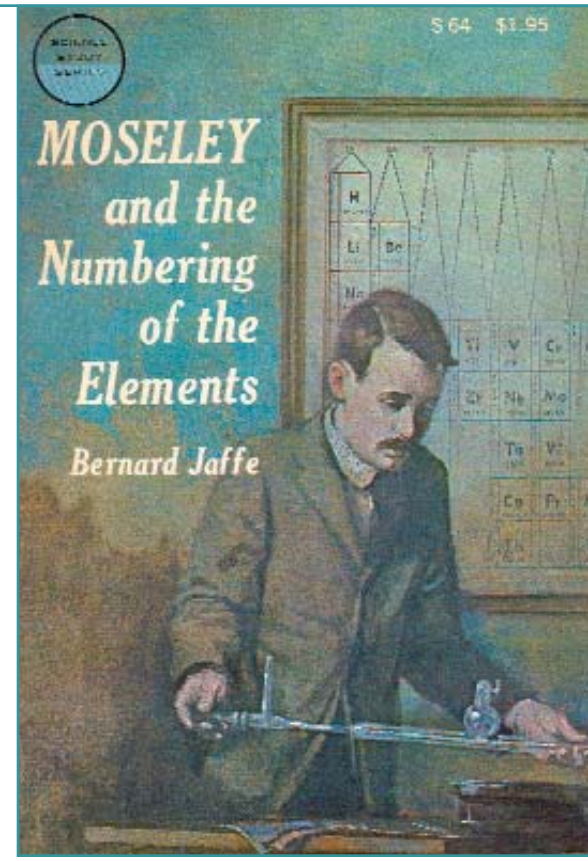
Honoring A Hero

A Letter from Oliver Sacks

I was delighted to read in the January-February 2005 issue of *Chemistry International* that IUPAC (at last!) approved a name for element 111—and especially that the new name honors a great hero of mine, [Wilhelm Conrad] Roentgen. I think that Roentgen too would be pleased by this, though he was the most modest of men, too modest even to go to Stockholm when he was awarded the first Nobel Prize in physics.

Prior to the 1940s there were only two elements with names honoring scientists—the rare-earth elements samarium and gadolinium (Samarski was a mining engineer, Gadolin was a chemist)—though other names (davyum, scheelium, etc.) had been proposed over the years, but dropped. When the highly radioactive transuranic elements started to be created there was a strong move, starting with curium (element 96), to honor the pioneers of the new age with their names. So, curium was followed by einsteinium (99), fermium (100), mendelevium (101), lawrencium (103), rutherfordium (104), seaborgium (106), bohrium (107), and meitnerium (109). Though one might expect chemical elements to be honored by the names of chemists, only Mendeleev and Seaborg, of the above group, were primarily chemists. (It is true that Rutherford was given his Nobel Prize in chemistry, but this aroused his amusement because he was, and considered himself, a physicist, and had little respect for other sciences: If science was not physics, he once said, it was only "stamp-collecting.") Marie Curie, of course, got Nobel Prizes in both chemistry and physics, and her final isolation of radium was a marvel of applied chemistry.

One wonders who will be chosen when the elements from 112 on are finally given approved names by IUPAC. Two names immediately come to mind—names of great pioneers from the heroic early years of the twentieth century when so many new elements were being discovered and the Periodic Table was completed, at least in principle, up to uranium. One such pioneer was Frederick Soddy, who worked with Rutherford in their crucial years in Montreal, defining new radioactive isotopes and their pathways of decay. (It was Soddy who coined the word "isotope," and in 1921 he was awarded the Nobel Prize in chemistry.) The other is Henry Gwyn Jeffreys (Harry) Moseley, the dazzling young theoretical physicist who worked out the real meaning of atomic numbers, and then, in principle, completed the Periodic Table by predicting the existence of elements 43, 61, 72, 75, 85, 87, and 91, stressing that these, and these alone, remained to be discovered. He thus, in Soddy's phrase, "called the roll of the elements." (Moseley was killed, tragically, at Gallipoli, in 1915—he was only 27, and there is no saying what he might have achieved had he lived.)



Moseley and the Numbering of the Elements, *by Bernard Jaffe, was published in 1971 by Doubleday and Anchors Books as part of their Science Study Series. The book traces Moseley's brief career in the context of the most exciting years of discovery in the 1910s, when scientists such as J.J. Thomson, Ernest Rutherford, Hans Geiger, and Niels Bohr set the stage for the nuclear age to come. Jaffe, just about 10 years younger than Moseley, had a long career himself as a science writer. He died in 1996 at the age of 90.*

Oliver Sacks, author and neurologist, has had a life-long interest in the sciences and a fascination with the periodic table. In his recent memoir, he invokes his childhood in wartime England and his early scientific fascination with light, matter, and energy as a mystic might invoke the transformative symbolism of metals and salts. The "Uncle Tungsten" of the book's title is Sacks's uncle Dave, who manufactured light bulbs with filaments of fine tungsten wire, and who first initiated Sacks into the mysteries of metals.

www.oliversacks.com

IUPAC Elections

Nominations for the various positions that fall vacant at the end of 2005 must be received by the Secretary General at the IUPAC Secretariat before 20 June 2005, (i.e., two months before the start of the 43rd IUPAC Council Meeting). Bryan Henry (Canada), vice president and president-elect, becomes president on 1 January 2006. On that date, Leiv K. Sydnes (Norway), current president, will become past president and remain an officer and a member of the Bureau for a period of two years. Other continuing officers include David StC. Black (Australia) as secretary general and Christopher F. Buxtorf (Switzerland) as treasurer.

See the IUPAC Web site for the final document <www.iupac.org/news/archives/2005/43rd_council>.

The candidates—as of 1 May 2005—for each position are listed below:

Provisional IUPAC Elections Ballot

Vice President

- ❍ Srinivasan Chandrasekaran (India)
- ❍ Kazuko Matsumoto (Japan)
- ❍ Nicole Moreau (France)

Bureau

- ❍ Chunli Bai (China)
- ❍ Dušan Berek (Slovakia)
- ❍ Srinivasan Chandrasekaran (India)
- ❍ Abu Mahmood (Bangladesh)
- ❍ Kazuko Matsumoto (Japan)
- ❍ Stanislaw Penczek (Poland)
- ❍ Elsa Reichmanis (USA)
- ❍ Alan Smith (UK)
- ❍ Maria van Dam-Mieras (The Netherlands)

Vice President

The vice president to be elected at the 43rd Council Meeting will be president-elect, and will become president on 1 January 2008. Nominations received for vice president (as of 1 May 2005) are as follows:

- Srinivasan Chandrasekaran (India)
- Kazuko Matsumoto (Japan)
- Nicole Moreau (France)

Srinivasan Chandrasekaran (India)

Professor Chandrasekaran's research has been concerned with the development of new synthetic methodology for organic synthesis, synthesis of natural products, organometallic chemistry, catalysis, study of reaction mechanisms, and organic materials.

Education and Career

Chandrasekaran earned his B.S. (1965), M.S. (1967), and Ph.D. (1972) degrees at Madras University in Madras, India. His doctoral supervisor was Prof. S. Swaminathan in the Department of Organic Chemistry. He held postdoctoral fellowships/associateships in the laboratories of Prof. E.J. Corey at Harvard University, Cambridge, MA, USA (1973–1975 and 1976–1977) and Dr. J.A. Edwards at Syntex Research, Palo Alto, CA, USA (1975–1976).

He is currently the chairman, Division of Chemical Sciences, and professor, Organic Chemistry at the Indian Institute of Science, Bangalore, India. He was earlier the chairman of the Department of Organic Chemistry (1996–2003) and Amrut Mody Chair Professor of Chemistry. From 1978 to 1989, he worked in the Department of Chemistry at the Indian Institute of Technology, Kanpur, India, where he served as lecturer (1978–1980), assistant professor (1981–1985), and professor (1985–1989). He has been a visiting professor at the Australian National University, Canberra (1985); University of Karlsruhe, Germany (1987); RWTH, Aachen, Germany (1992, 1996); University Paris Sud, France (1998, 2001), and Chinese Academy of Sciences, Beijing (2001).

Chandrasekaran has published over 170 research papers in national and international journals. Over the years he has supervised 26 Ph.D students, 60 M.S. students, and 40 postdoctoral fellows. He is a consultant to a number of chemical and pharmaceutical industries in India and abroad.

IUPAC Involvement

Chandrasekaran has been an elected member of the IUPAC Bureau since 2002 and has been a member of the Project Committee. He also served on the IUPAC Commission on Nomenclature of Organic Chemistry (1993–1995) and is currently on India's IUPAC National Committee.

Related Professional Activities

Chandrasekaran has been a member of many committees and organizations: associate editor, *Proceedings of the Indian Academy of Sciences* (Chemical Sciences, 1991–2000); member, Sectional Committee, Chemistry, Indian Academy of Sciences (1991–1998); editor, 10th International Conference on Organic Synthesis, Bangalore (1994); member, Editorial Board, *Indian Journal of Chemistry* (1995–2001); member, Program Advisory Committee in Organic Chemistry, Department of Science and Technology, New Delhi (1995–2001); member, Research Committee on Chemistry and Technology, Council of Scientific and Industrial Research, Govt. of India (CSIR, 1995–2001); member, Council of Indian National Science Academy (1998–2000); convener, National Symposium in Chemistry, Bangalore (1999); member, Task Force on Green Chemistry, Govt. of India; secretary, Indian Academy of Sciences, Bangalore; vice president, Chemical Research Society of India. He also serves as a member on the Research Councils of a number of CSIR laboratories and leading academic institutions in India. He has also served as a member on the Board of Studies of a number of universities in India. Chandrasekaran has delivered more than 180 invited lectures and seminars at various national and international meetings, universities, and research institutions in India and overseas.

Awards

Chandrasekaran received the Basudev Banerji Medal and Prize from the Indian Chemical Society in 1988 and the Shanti Swarup Bhatnagar Prize from CSIR in 1989. He was Prof. A.B. Kulkarni Endowment Lecturer at the University of Bombay in 1992; Prof. N. Venkatsubramanian Endowment Lecturer at the University of Madras in 1993; Prof. T.R. Seshadri Memorial Lecturer at Delhi University in 1998; Prof. Siddappa 60th Birthday Commemoration Lecturer at Dharward University in 1999; Professor O.P. Vig Endowment Lecturer, Panjab University, Chandigarh in 2000, Jawaharlal Nehru Birth Centenary Lecturer of the Indian National Science Academy in 2001; 125 Years-Indian Association for the Cultivation of Science, Kolkata—Commemoration Lecturer in 2002 ; and Prof. Sukh Dev Endowment Lecturer, Pune University, in 2004. He received the Silver Medal of the Chemical Research Society of India (2002), Medal of the Material Research Society of India (2004), and the Alumni Award for Excellence in Research in Science (2004). Chandrasekaran was appointed research fellow of the Indian National Science Academy (1985–1987); fellow of the Indian Academy of Sciences (1989); and fellow of the Indian National Science Academy (1992); honorary professor of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore (2000–present); and fellow of the Third World Academy of Sciences, Trieste, Italy (2000).

Kazuko Matsumoto (Japan)

Professor Kazuko Matsumoto's research involves metal coordination chemistry and bioanalytical chemistry using metal complexes. She started her career as an inorganic chemist and has been expanding her expertise in designing and synthesizing new functional metal complexes such as fluorescent lanthanide labels for time-resolved detection in bioanalysis, and catalysis and electrical and magnetic properties of nanowire metal complexes of metal-metal bonds.

Education and Career

Matsumoto received her B.S. in 1972 and Ph.D. in 1977, both from the University of Tokyo. She started her academic career in 1977 as a research associate working with Prof. Keiichiro Fuwa at the University of Tokyo, and then moved to Waseda University as an associate professor in 1984. She was promoted to a full professor at Waseda University in 1989, and has served there ever since. During these years, she spent two years (1991–1992) at the Institute for Molecular Science (Japan) as an adjunct professor, and spent half a year (1993) with Prof. Steve Lippard at MIT as a visiting professor. In addition, she visited and gave lectures at major Japanese and foreign universities (Bari, Florence, Dortmund, Leiden, Bazel, California Institute of Technology, Stanford) as a visiting professor. She also has given invited lectures at many internationally renowned academic meetings. (She will be a lecturer at the IUPAC Congress in Beijing in August 2005.) She has published more than 200 scientific papers in analytical and inorganic chemistry and holds 40 patents.

IUPAC Involvement

Matsumoto has been a titular member on the Analytical Chemistry Division (2002–2005) and is preparing a project on the definition of concentrations of biomole-

cules. In Japan, she is a member of the chemistry division of the Science Council of Japan, which is the corresponding organization for IUPAC in Japan.

Related Professional Activities

Matsumoto is a member of the Engineering Academy of Japan, and is also a member of the Council for Science and Technology Policy, cabinet office. For more than 10 years, she has served on the advisory board of major scientific journals including the *Bulletin of the Chemical Society of Japan* and the *European Journal of Inorganic Chemistry*. She also served as the vice president of the Japan Society for Analytical Chemistry (2001) and is now the chairperson of the international relations committee of the Chemical Society of Japan. She has worked as the national representative in FACS (the Federation of Asian Chemical Societies) and organized the EurAsia conference (an international conference between Asia and Europe) in Asia.

Awards

Matsumoto has earned honors for her outstanding contributions to chemistry, which include the Award for Promotion of Young Researchers from the Japan Society for Analytical Chemistry (1984), the Division Award from the Chemical Society of Japan (1989), and the Ichimura Award (2000).

Nicole J. Moreau (France)

After 10 years of research in organic synthesis, terpenes, steroids, and sugars, Professor Nicole J. Moreau successfully designed the first purification, using affinity chromatography, of enzymes that inactivate aminoglycoside antibiotics. Her research is at the interface of chemistry and life sciences, and she continues to study the mode of action of antibiotics and the ways bacteria can resist them. She developed a mean throughput screening system in order to find molecules able to be active against resistant bacteria, for instance inhibitors of efflux pumps or of inactivating enzymes. She has also researched molecular pharmacology, structure-activity relationships and synthesis of analogues of active compounds together with molecular modeling and docking calculations. In 2005, she launched, together with CNRS and Rhodia, a new program on fine chemistry using bioconversions.

Education and Career

Moreau received an M.S. in physical chemistry from the University of Paris (Sorbonne). She obtained a doctorate in physical sciences (chemistry distinction) in 1967 from Orsay University.

Since 1999, Moreau has been a professor at Ecole Nationale Supérieure de Chimie de Paris (ENSCP), where she is the leader of the Laboratory of Biochemistry. From 1994–1999 she was a professor in the Laboratory of Molecular Research on Antibiotics at the Paris 6 University (Pierre and Marie Curie). In 1973, she was a postdoctoral fellow in the laboratory of Dr. J. S. Pitton at the Medical Microbiology Institute in Geneva, Switzerland. Moreau began service with the Centre National de la Recherche Scientifique (CNRS) in 1962, where she was "directeur de recherche" from 1979 to 1992. In 1972, Moreau joined the chemistry laboratory of Prof. Le Goffic at Ecole Normale Supérieure in Paris, where she worked until 1993.

Moreau has authored more than 80 publications, given more than 90 conferences or oral presentations, and supervised 25 Ph.D and 22 M.S. students and 10 post-doctoral fellows. She is responsible for teaching at the interface of chemistry and life sciences at the Ecole Nationale Supérieure de Chimie de Paris and is a member of the Administration Committee of the French Society of Biochemistry and Molecular Biology.

IUPAC Activities

Since 2000, Moreau has been an elected member of the Bureau and also a member of the project committee. She has served as vice president and currently is general secretary of the French National Committee for Chemistry. She has been a member of the French Delegation since 1995.

Related Professional Activities

Moreau has held a number of leadership positions with leading chemistry institutions. She has served as chargé de mission, State Department of Research (Ministère de la Recherche), deputy director of the Drugs department (1984–1989) and has been chargé de mission (1993–1997), then deputy director (1998–2003), at CNRS, Department of Chemical Sciences. Since 2003, she remained chargé de mission for natural substances for the CNRS Chemistry Department and International Relationships Direction.

She was secretary (1989–1997), then president

(1997–1999) of EUCHEM, European Chemistry; president of GESA; Study Group of Structure-Activity Relationships (1990); vice-president of the French National Committee for Chemistry, CNC, IUPAC NAO (1994–2002). In addition, she is a long-time member of the French Chemical Society, French Microbiology Society, and the French Biochemistry and Molecular Biology Society.

Awards

Moreau was awarded the Prix de l'Académie de Pharmacie, Paris, in 1974, and the Chevalier de l'Ordre National du Mérite, awarded by the State Department of Research, in 2002. In 2004 she received the Silver Medal of the International Foundation of la Maison de la Chimie.

Bureau

Elected Members of the Bureau, retiring in 2005, who are not eligible for reelection, but who may be nominated for another office: Edwin P. Przybylowicz (USA) and Gus Somsen (Netherlands).

Elected Members of Bureau, retiring in 2005, who are eligible for renomination and election for a further four-year period: Chunli Bai (China); Srinivasan Chandrasekaran (India); Robert G. Gilbert (Australia); and Alan Smith (UK).

Elected Members of Bureau, who were elected at the 42nd Council until 2007:

- **Anders Kallner (Sweden)**
- **Werner Klein (Germany)**
- **Nicole Moreau (France)**
- **Oleg Nefedov (Russia)**

Nominations for Bureau received as of 1 May 2005 (the statutory deadline is 20 June 2005) are as follows:

- **Chunli Bai (China)—*reappointment***
- **Dušan Berek (Slovakia)**
- **Srinivasan Chandrasekaran (India)—*reappointment***
- **Abu Mahmood (Bangladesh)**
- **Kazuko Matsumoto (Japan)**
- **Stanislaw Penczek (Poland)**
- **Elsa Reichmanis (USA)**
- **Alan Smith (UK)—*reappointment***
- **Maria van Dam-Mieras (Netherlands)**

Chunli Bai (China)

Professor Chunli Bai is the president of the Chinese Chemical Society and executive vice president of the Chinese Academy of Sciences. Bai's research has involved molecular nanostructures and nanotechnology, scanning probe microscopy, and molecular self-assembly on the liquid and solid interfaces.

Education and Career

In 1978, Bai graduated from the department of chemistry, Beijing University. He received his M.S. in 1981 and Ph.D. in 1985 from the Institute of Chemistry of the Chinese Academy of Sciences (CAS). From 1991 to 1992, he was a visiting professor at Tohoku University in Japan. He performed postdoctoral research from 1985–1987 at the California Institute of Technology. He is an academician of CAS and a fellow of the Third World Academy of Sciences (TWAS). He has more than 300 research papers to his credit, and has authored 11 monographs and several book chapters either in English or in Chinese.

IUPAC Involvement

Bai has been an elected member of the IUPAC Bureau since 2002 and a member of the Executive Committee since 2004.

Related Professional Activities

Bai is chief scientist of the National Steering Committee for NanoScience and Nanotechnology, director of China National Center for Nanoscience and Technology, president of Graduate University of the Chinese Academy of Sciences, vice-president of the China Association for Science and Technology, vice-president of the Western Returned Scholars Association, vice-president of the Chinese Materials Research Society, and president of the Chinese Association for Young Scientists and Technicians. In addition, he serves as a member of the Academic Degrees Committee of the State Council.

Awards and Honors

Bai is a recipient of the "International Medal" given by the London-based Society of the Chemical Industry and the TWAS 2002 Medal Lecture in Chemical Sciences. As a project leader, Bai has won more than 10 national, CAS-awarded, or ministerial prizes. He has

received the titles of "National Advanced Worker," "Young and Middle-Aged Specialists with Outstanding Contributions to the Country," and "Top 10 Outstanding Youths in China." He also has won National Awards for Young Chinese Scientists, Awards for Outstanding Young Scholars conferred by Hong Kong's Qiu Shi S&T Foundation, and Awards for Outstanding Chinese Visiting Scholars from the Hong Kong Polytechnic University.

Dušan Berek (Slovakia)

Professor Dušan Berek has been active in the field of high-performance liquid chromatography of synthetic polymers, developing new types of column packings, as well as unconventional methods for their evaluation. He has worked out several original "coupled" procedures for liquid chromatographic separation and characterization of complex polymer systems.

Education and Career

Berek graduated from the Faculty of Chemical Technology, Slovak Technical University in Bratislava in 1960. In 1966, he received his Ph.D. in physical chemistry from the Polymer Institute of the Slovak Academy of Sciences in Bratislava, Slovakia, and the Institute of Macromolecular Chemistry at the Academy of Sciences in Prague, Czech Republic. In 1991, he received his D.Sc. in Macromolecular Sciences from the Slovak Technical University and Slovak Academy of Sciences in Bratislava.

Since 1991, Berek has been head of the Laboratory of Liquid Chromatography Polymer Institute at the Slovak Academy of Sciences, where he has worked since 1960. Previously, Berek served as vice-director (1989–1990) and head (1980–1991) of the Department of Thermodynamics and Hydrodynamics of Polymer Systems. Prior to that he was head of the Department of Physical Chemistry (1966–1971).

He is author or co-author of two monographs, over 240 scientific papers in extenso, and chapters in books. He holds over 60 patents. Three of his patents were licensed to companies producing chromatographic materials and one to a company producing fillers for rubber. He has been an invited speaker at many universities and research institutions all over the world, and has delivered more than 300 lectures. In addition, he has presented over 70 invited lectures and numerous regular contributions at international scientific meetings.

IUPAC Involvement

Since 1993, Berek has been chairman of the Slovak National Committee of Chemistry for IUPAC. From 1998–2003, he was the chair of the IUPAC Working Party on Molecular Characterization of Commercial Polymers. He has also been a member of the Commission on Chromatography (1998–2001) and a member of the Macromolecular Division Committee (2001–2003).

Related Professional Activities

Since 2005, Berek has been the vice president of the Slovak Chemical Society; he was president from 1997–1999 and from 2003–2004. In addition, he has been a member of the Board of the Federation of European Chemical Societies (1993–1996) and the Presidium of the Slovak Academy of Sciences (1992–1995). From 1991–1992 he was chairman of the Czecho-Slovak National Committee of Chemistry.

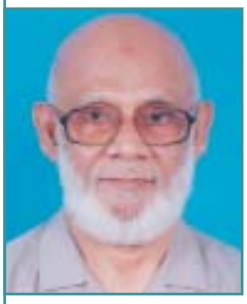
Berek has served on the organization committees of over 30 international conferences (14 times as chair) and on 12 international scientific boards of various symposia. Among the symposia he organized, four were under IUPAC auspices. He is a member of the editorial boards of four international journals: *International Journal of Polymer Analysis and Characterization*, *International Journal of Polymeric Materials*, *Chemical Papers*, and *Current Analytical Chemistry*.

Awards

Berek received the Gold Medal (1995) and Honorary Membership (2001) from the Slovak Chemical Society, Hanus Medal of Czech Chemical Society (2000), Commemorative Medal of the Polish Chemical Society (2003), and Gold Plaque of the Slovak Academy of Sciences (1998).

Srinivasan Chandrasekaran (India)

See bio. on page 17 as nominee for vice president.



Abu Jafar Mahmood (Bangladesh)

Professor Abu Jafar Mahmood, president of the Bangladesh Chemical Society, has more than four decades of experience in the teaching and practice of chemistry. His research interests comprise chemical kinetics, photochemistry, surface chemistry and catalyst characterization, polymer chemistry, renewable energy sources, and environmental chemistry. Currently his major research emphasis is on zinc oxide mediated degradation by visible light of a number of reactive dyes used by the fabric dyers of the country. This process holds promise for removing residual dyes from factory effluent.

Education and Career

Mahmood received M.S. degrees from the University of Dhaka in 1960 and from the University of Leeds in 1965, and a Ph.D. from Cambridge University in 1972. He joined the Department of Chemistry at Dhaka as a teaching fellow in 1961 and has continuously served the department ever since. He was chairman between 1988–1991 and recently from June 2002 to January 2005.

Mahmood has produced 60 papers that were either published in national and international journals or presented at conferences, seminars, and symposia at home and abroad. In addition, he has supervised a large number of M.S. and some Ph.D and M.Phil. students.

Related Professional Activities

Mahmood has been elected as a lifetime member of numerous organizations: Bangladesh Chemical Society, Bangladesh Association for Advancement of Science, Asiatic Society of Bangladesh, Physical Society of Bangladesh, Bangla Academy, and Catalysis Society of India. In addition, he is a fellow of the Royal Society of Chemistry (London) and is a Chartered Chemist.

Mahmood has played a leadership role in organizing many chemistry conferences in Bangladesh. Most recently he was chairman of the Organizing Committee for the Bangladesh Chemical Congress 2004. He was also chairman of the Organizing Committee for the National Workshop on Pesticide Residues, held in January 2003.

Since 2003, Mahmood has been editor of the *Dhaka University Journal of Science,* and since 1999 he has been one of the editors of (and contributors to) *Bangla Academy Biggan Bishwakosh* (Encyclopedia of Science in Bangla).

He has also held advisory or leadership positions on numerous committees and projects. From 1990–1997 he was chairman of the sectional committee on "Fine Chemicals" of the Bangladesh Standard Institution. In 1990, he worked out a plan of collaboration and formally signed a memorandum of agreement between Lamar University in Beaumont, Texas, USA, and Dhaka University for collaborative research in specific areas of chemistry. In 2000, he visited Utsunomiya University in Japan and initiated its collaboration with Dhaka University.

Kazuko Matsumoto (Japan)

See bio on page 18 as nominee for vice president.

Stanislaw Penczek (Poland)

Professor Penczek's research activities have focused on kinetics, thermodynamics, and mechanisms of the polymerization processes, as well as on the synthesis of new polymer structures. Among his many accomplishments was establishing identical reactivities of ions and ion-pairs in cationic ring-opening polymerization at a time when the paradigm of higher reactivity of ions (free) was generally accepted as a dominating viewpoint. He also applied for the first time in macromolecular chemistry, dynamic NMR for studies of the ultra fast reactions of exchange between various ionic forms of active species. In addition, he developed a new general method of synthesis of soluble, highly branched (star shaped) polymers by catalytic reaction of macromolecular alcohols with bicyclic compounds (e.g., diepoxides) and methods of synthesis of simple, high molar mass phosphodiester chains with identical repeating

units as in nucleic acids and teichoic acids.

Education and Career

Since 1974, Penczek has been a professor and head of the Department of Polymer Chemistry at the Polish Academy of Science in Lodz. He received his Ph.D. in 1963 from the Industrial Polymer Institute (Warsaw and Leningrad) of the USSR Academy of Science. From 1964–1968, Penczek was head of the Industrial Polymer Institute at the Laboratory of Polymerization. From 1966–1967, he was a post-doctoral fellow under Prof. M. Szwarc at Syracuse University, New York, USA.

Penczek has been a visiting professor at nine universities in Europe and the United States. He has given invited lectures at 80 international meetings and made over 290 printed contributions, including 8 monographs and textbooks and 15 chapters in books and monographs.

IUPAC Involvement

Penczek was a titular member of the Macromolecular Division from 1998–2001 and has been an associate member of IUPAC since 2002. He was also chairman of the World Polymer Congress 2000—38th IUPAC International Symposium on Macromolecules. He has also been chairman of two, and co-chairman of four, international symposia sponsored by IUPAC.

Related Professional Activities

In 1998, Penczek was elected a member of the Polish Academy of Science. He is also a longstanding member of the Polish Chemical Society, of which he served as chairman of the Division of Kinetics (1978–1988) and chairman of the Polymer Division (1988–1998). From 1997–1999 he was president of the European Polymer Federation and in 1993 he was a titular professor of the French Academy of Science.

Penczek is a member of the editorial boards of 11 international polymer journals, and is co-editor of *e-Polymers*, the first fully electronic polymer journal.

Awards

Over the course of his career, Penczek has received numerous honors: awards from the Polish Academy of Science (1974, 1985, 1988, 1989); Medal of the University of Jena (1988); M. Sklodowska-Curie Prize (1990); Medal of the French Academy of Science (1993); Chevalier dans l'Ordre de Palmes Académiques, France (1998); Biannual International Award of the Belgian Polymer Group (2001); Eminent Professor of RIKEN, Japan (2001); International Award and Personal Medal of the Society of Polymer Science, Japan (2002); Otto Warburg Foundation Award, Germany (2003); and the Biannual M. and P. Curie Joint Prize of the French and Polish Chemical Societies (2004). Penczek is Doctor of Honoris Causa of the University Pierre and Marie Curie in Paris (2003) and of the Russian Academy of Sciences (2004).The same year he was given a title of honorary professor of the Jagiellonian University in Krakow (Poland).

Elsa Reichmanis (USA)

Dr. Reichmanis' research interests include the chemistry, properties, and application of materials technologies for photonic and electronic applications, with particular focus on polymeric and nanostructured materials for advanced communications technologies

Education and Career

Reichmanis is Bell Labs fellow and director of the Materials Research Department at Bell Laboratories, Lucent Technologies. She received her Ph.D. and B.S. degrees in chemistry from Syracuse University, and joined Bell Labs in 1978 after completing a post-doctoral fellowship program.

IUPAC Involvement

Reichmanis has been active in IUPAC throughout her career. She was a member of the U.S. National Committee for IUPAC for six years and has served on the U.S. delegation to the IUPAC General Assembly three times. She has been active in the Macromolecular Division of IUPAC, having served a term as a titular member.

Related Professional Activities

In 2003, Reichmanis was president of the American Chemical Society (ACS). She is past-chair of the ACS Polymeric Materials Science and Engineering Division and has served as a member of the executive committee of the division since 1986. She is a member of the ACS Committee on Science and has served on the ACS Publications Committee and the *Chemical and Engineering News* Editorial Board, and is associate editor of the ACS journal *Chemistry of Materials*.

In other technical capacities, Dr. Reichmanis has served as a member of the Japanese Technology Evaluation Program Panel in Advanced Materials, the U.S. National Research Council (NRC) Committee to Survey Materials Research Opportunities and Needs for the Electronics Industry, and the NRC Committee on Policy Implications on International Students and Postdoctoral Scholars in the United States. She is also a former member of the NRC National Materials Advisory Board. Currently, she serves on the NRC Board on Chemical Sciences and Technology.

Awards

Reichmanis has received numerous awards, including the 1993 Society of Women Engineers Achievement Award. She was elected to the U.S. National Academy of Engineering in 1995 and named Bell Laboratories Fellow that year. She was the 1996 recipient of the ASM Engineering Materials Achievement Award, and was elected Fellow of the American Association for the Advancement of Science in 1998. She was awarded the 1999 ACS Award in Applied Polymer Science, the 2001 Society of Chemical Industry Perkin Medal, and the Arents Medal from Syracuse University. In 2004, she was elected as a Foreign Member of the Latvian Academy of Sciences. She is also a member of the American Physical Society, the Materials Research Society, the Institute of Electrical and Electronics Engineers, and the Society of Photo-optical Engineers.

Alan Smith (United Kingdom)

For more than 30 years, Dr. Smith has held leadership positions in the chemical industry. Most of his career was spent with Laporte, but he also worked for BDH/Merck for and started a consulting company.

Education and Career

Smith gained his B.Sc. (Hons.) in chemistry at Queen Mary College, University of London in 1965, during which time he had his first publication while still an undergraduate. He stayed on there and in 1968 received a Ph.D. in physical organic chemistry. He was then awarded a NATO Postdoctoral Fellowship for two years (1968–1970) and spent the first year on research into heterocyclic chemistry at the Technical University in Delft, Netherlands. The second year was spent in the School of Pharmacy, Nottingham University.

He joined the staff of the University of East Anglia (1970–1972), where he lectured and carried out research for the International Institute of Synthetic Rubber Producers. From 1972 to 1987, he worked at Laporte, during which time it became a leader in specialty chemicals. As Head of Research and Development, he had worldwide responsibilities for Laporte' s technology, and he also looked after their laboratories for Interox, Laporte' s joint venture with Solvay.

From 1987 to 1991, he was on the Board of BDH/Merck in the UK, where he was technical director and ran their Advanced Materials Business. From 1991 to 1996, he returned to Laporte as the head of Group Technology, with responsibilities for worldwide technical matters, especially relating to their extensive program of acquisitions.

In 1996, he set up AZTECH Consultancy, which advises on scientific technical matters and acquisitions and mergers, and included the post of part-time technical director for BIP, Ltd. He is currently actively involved in UK government projects, the main one is their initiative on nanotechnology. He also carries out roadmapping strategies for the South African government.

IUPAC Involvement

Smith is a titular member of the Committee on Chemistry and Industry, which he has been a part of since 1994. From 1995 to 1999, he was on the Editorial Advisory Board for *Chemistry International*. He is also a titular member of the CHEMRAWN Committee, which he has been a member of since 1998. From 1997 to 2001, Smith was a delegate for the UK's National Committee, and in 2001 he was chairman of the UK delegation. Since 2002, he has been a member of the Bureau and a member of the Project Committee. He is also currently chairman of the Future Actions Committee for the Chemistry for Water CHEMRAWN conference held in Paris in 2004.

Related Professional Activities

Smith served on the Chemical Industry Association's Science, Education, and Technology Committee from 1986 to 1996. He is past president of the Industrial Affairs Division of the Royal Society of Chemistry, and is also on the following RSC committees: Annual

Conference Committee, Innovation Team Award Committee, and the Research Fund Committee. He is a member of the Industrial Advisory Boards for Chemistry at Imperial College and Bristol University, and lectures at the University of Strathclyde and Nottingham University. He was on a CBI task force to obtain industrial input for the next Research Assessment Exercise for UK universities. He is on the Board of the latest Faraday Partnership on Colloids, established by the UK Government. From 1995 to 1999, he was on the Chemicals Panel of the Government's Foresight exercise. From 1999 to the present, he has been on the Materials Panel, and continues to lecture extensively on foresight. He is a fellow of the Royal Society of Chemistry and a fellow of the Linnean Society.

Maria C.E. (Rietje) van Dam-Mieras (The Netherlands)

Since 1993, Professor Maria C.E. van Dam-Mieras has been chair of Natural Sciences at the Open University of The Netherlands in Heerlen. In this position and other leadership roles, her activities have involved higher education in sustainability and globalization, chemistry curriculum in secondary education, biotechnology, environmental science, and knowledge transfer.

Education and Career

Prof. van Dam-Mieras studied biochemistry and inorganic chemistry at the University of Utrecht in The Netherlands and received her Ph.D. from the same university in 1976. She started her academic career at the Limburg University in Maastricht, where her research was focused on blood coagulation and vascular pathology.

In 1983 she joined the Faculty of Natural Sciences at the newly founded Open University of The Netherlands in Heerlen, where she developed course materials in biotechnology, pollution prevention, and sustainable development. Also she was involved in several research programs of the European Union (COMETT, TEMPUS, PHARE, and SOCRATES). In 1992 she was appointed to the chair of Natural Sciences at the Open University.

In 1996, van Dam-Mieras became rector of the Open University. In 1997, she was appointed chair of the Copernicus Task Group of the European Association of University Rectors. The work of the Task Group led to the formation of "Copernicus-campus," a network of European Universities dealing with the role of higher education in sustainability and globalization. From 1995-2001 she was a member of the Scientific Advisory Board of the "Deutsches Institut für Fernstudien Forschung" at the University of Tübingen in Germany. In 2000, she became a member of the Supervisory Board of the Institute of Environmental Science of the University of Antwerp in Belgium, and since 2003, she has been a member of the Board of Trustees of Lüneburg University in Germany.

IUPAC Involvement

Prof. van Dam-Mieras is a member of the joint ad-hoc Committee for IUPAC of the Royal Netherlands Chemical Society (KNCV) and the Royal Netherlands Academy of Sciences. Since 2003, she has been a board member of the KNCV and was previously president elect, president, and immediate past president.

Related Professional Activities

From 1998 until 2003 van Dam-Mieras was a member of the national "Scientific Advisory Council for Government Policy" in The Netherlands. Since 1997 she has been a member of the Board of Commissioners of the "Akzo Nobel Nederland" concern. In 2000 she joined the Board of Trustees of the Dutch organization TNO (Applied Scientific Research) and since 2001 has held a position on the societal advisory board of the Division on Chemical Sciences of the organization NWO (Netherlands Scientific Research). In 1995 she was a member of the working group that developed the outline for the new natural sciences program in Dutch Secondary Education, and since 2002, has been a member of the working group developing the outline for a new chemistry curriculum in secondary education. Since 2003, she has been chairperson of the Dutch-Flemish Association of Science Centres.

www.iupac.org/news/archives/2005/43rd_council

Wolfram vs. Tungsten

The following piece includes both an expression of concern over the name of the element W (atomic number 74) and a formal response formulated on behalf of the editors of the 2005 edition of the IUPAC Nomenclature of Inorganic Chemistry.*

by Pilar Goya and Pascual Román

Both of the names wolfram and tungsten have traditionally been used for the element with atomic number 74. The authors would like to express their concern about leaving only one name.

In the last revision of the Red Book the name wolfram has been removed from the table and so have the terms wolframate, wolframy, and so on. For the element with atomic number 74, with symbol W, the only name left is tungsten, together with the corresponding forms tungstate, tungsty, etc. In fact, the only reference to the original name of the element is a footnote indicating "the element symbol W derives from the name wolfram."

The rule of leaving only one name and a footnote for those elements that had a second name in brackets cannot be applied in this case because the name is directly linked to the discovery of the element. It does not refer to a Latin root, as in antimony, copper, gold, iron, lead, mercury, potassium, silver, sodium, and tin.

Therefore, as IUPAC members and on behalf of most Spanish chemists, we would like to bring this issue up for discussion and request the name wolfram be maintained based on the following reasons:

- If we turn to historical facts, it is well documented and generally accepted, that the true discoverers of element 74 were J.J. Delhuyar and F. Delhuyar who were the first to isolate the pure metal from wolframite $(Fe,Mn)WO_4$ in Spain in 1783 (see below).
- It is also a fact that C.W. Scheele and T.O. Bergman were the first to obtain the trioxide (WO_3) from scheelite ($CaWO_4$) two years before, but they did not isolate the pure element.
- The word wolfram derives from the German *wolf's rahm*, literally meaning wolf´s foam or *spuma lupi*, which is how wolframite was traditionally known by the saxon miners. The pure element was isolated from wolframite. Tungsten is derived from the Swedish *tung* (heavy) and *sten* (stone) meaning heavy stone in reference to the mineral scheelite from which the trioxide was isolated.
- Since the symbol of the element is W it is logical and self-explanatory that it derives from wolfram and not from tungsten. It usually has been acceptable to use the name proposed by those who isolated the element itself and not compounds containing the element in their formula, as is the case of the trioxide.
- On page 88 of the original scientific paper published in 1783 by the Delhuyar brothers[1] they claim the name volfram as follows:
  — "We will call this new metal volfram, taking the name from the matter of which it has been extracted.... This name is more suitable than tungust or tungsten which could be used as a tribute to tungstene or heavy stone from which its lime was extracted, because volfram is a mineral which was known long before the heavy stone, at least among the mineralogists, and also because the name volfram is accepted in almost all European languages, including Swedish."
  (Note that at that time, the letter "w" did not exist in the Spanish alphabet, but appeared for the first time in 1914 and is now included).

On the basis of all the above, we cannot understand why the name wolfram has been definitely removed from the table, and we claim that the name proposed by its discoverers, which had been accepted since the beginning by the scientific community, should be kept following the Delhuyar brothers' wishes.

. . . we cannot understand why the name wolfram has been definitely removed from the table . . .

This is not the first time this issue has been raised. Many Spanish chemists have defended the name wolfram for years.[2,3] In reference textbooks it can be read: "The name 'wolfram', from which the symbol of the element is derived, is still widely used in the German literature and is recommended by IUPAC, but the allowed alternative 'tungsten' is used in the English-speaking world."[4]

**Nomenclature of Inorganic Chemistry—IUPAC Recommendations 2005*, edited by Neil G. Connelly and Ture Damhus (senior editors), Richard Hartshorn, and Alan Hutton; *in press* by the Royal Society of Chemistry, 2005 [ISBN 0-85404-438-8]. This publication has been subject to an extended review, including a public review that occured in 2004. In IUPAC circles, this book (including former editions) is commonly referred to as the Red Book.

In short, many voices have been raised in favor of wolfram. According to R. Hoffmann and O. Sacks, "future generations of chemists will be bewildered at the symbol." On the basis of all this, we propose that in the table of the elements the name wolfram appear together with tungsten.

References
1. J.J. De Luyart and F. De Luyart, *Extractos de las Juntas Generales celebradas por la Real Sociedad Bascongada de los Amigos del País*, pp. 46–88, Vitoria, Septiembre 1783.
2. E. Moles, *Anales*, 1928, 26, 234–252.
3. P. Román, *Anales RSEQ*, 2000, 96(3), 35–45.
4. N.N. Greenwood and E. Earnshaw, *Chemistry of the Elements*, (2nd edition), p. 1002 ed, Butterworth-Heinemann, Oxford, 1997.

Pilar Goya is a research professor at the Instituto de Química Médica, CSIC, Madrid, Spain, and the Spanish representative in the IUPAC-UAC Committee. Pascual Román is a professor at the Universidad del País Vasco, Bilbao, Spain.

Reply from Ture Damhus

On behalf of the editors of the 2005 Red Book, I would like to reply to the inquiry of Professors Goya and Román.

One must first realize that IUPAC nomenclature recommendations are issued in, and intended for use in, the official language(s) of the union. When the 1957 rules (i.e., the first edition of the Red Book) appeared, those languages were English and French. Today, the one official language is, and has been for many years, English. (This was reconfirmed by unanimous vote at the 2001 Council in Brisbane.)

This requirement has been understood as a working condition for the group preparing the 2005 recommendations. The purpose of Table 1 therein, entitled "Names, Symbols and Atomic Numbers of the Elements," is thus to give element names for use in the English language. This is stated explicitly in Chapter 3 of the revised text.

IUPAC is often criticized for not doing enough to simplify nomenclature. It is particularly important to avoid the proliferation of names in something as fundamental to nomenclature as the naming of elements. Therefore, Table 1 in the revised Red Book gives only one name for each element.

When comparing this table with the corresponding table in the 1990 recommendations, we see that the old table contained a number of additional element names cited in parentheses, including wolfram. Unfortunately, the part of the main text referring to the parenthetical names made it rather unclear what the reason was for citing each of these names. The text stated clearly that they are not used in English—a fact making them, logically speaking, irrelevant for IUPAC nomenclature—but proceeded to say that they were mentioned either because they provided the basis of the atomic symbol, had entered into chemical nomenclature, or were IUPAC-approved alternatives. However, a name not used in English cannot "have entered into nomenclature," if this is understood as IUPAC-approved nomenclature, and cannot be an IUPAC-approved alternative. This is, therefore, a self-contradiction, which the new recommendations should seek to avoid. (In fact, the unfortunate text just cited was copied into the revised Red Book, albeit there referring to the footnotes rather than parenthetical names in the table itself. However, it is still contradictory and must be reworded, and we are grateful to Goya and Román for having caused us to reconsider this wording.)

The introduction to the 1957 rules expressed the hope that changes could be kept to a minimum when translating the recommended nomenclature into other languages, but at the same time acknowledged that certain names would be unacceptable in some languages. This certainly applies to a number of element names, including tungsten. For example, "wolfram" is also used in Denmark; however, I do not consider this a problem when adapting IUPAC nomenclature to Danish. And even if the revised Red Book repeats the trivial truth that "it is desirable that the names used in other languages differ as little as possible," I think it is safe to predict that IUPAC will not interfere with national nomenclatures for the time being.

It must be stressed, and has been stressed repeatedly in the last three versions of the Red Book, including the present revision, that the choice of an IUPAC name for an element is not intended to have any implications regarding the priority for discovery of the element. According to *current* rules for naming new elements,[1] the acknowledged discoverers are given the first opportunity to *suggest* a name for consideration by IUPAC, but the final decision about the name

still lies with IUPAC (ultimately with the Council). So, in our time the Delhuyar brothers might have proposed wolfram, and we might have ended up having that as the IUPAC name. But we cannot use that rule for a long-known element like tungsten, against prevailing usage in English.

It is correct that if the name wolfram is not used in nomenclature, students will have to learn some history of chemistry to know why the element symbol is W. Tungsten shares this, of course, with a number of other elements, such as potassium, mercury, and silver. There are other reasons in those other cases, but it will remain the privilege of teachers and textbooks, not IUPAC nomenclature recommendations, to tell future students the details of how that came about in each case.

The remaining issue to discuss is the derived names. In fact, for anions with tungsten as the central atom, the 1970 Red Book prescribed the use of wolframate, not tungstate. The 1990 Red Book listed wolframate as "an allowed alternative to tungstate" (in the oxoanions Table 9.2 there), but in Table VIII gave tungstide with no alternative. There was a similar situation with antimony/antimonide/antimonate/stibate.

We believe we have made the right choices regarding tungsten/wolfram and names derived from these.

For the revised Red Book, we want to select just one "ate" name for each element. Obviously, the easiest situation is to have all derived names formed from the element name, if possible. At the same time, there is a general desire to take common usage into account if this is compatible with the systematics of the nomenclature one is developing. This has been repeatedly mentioned in the Red Books. In the case of tungsten we believe that tungstate is the prevailing term used at this time in English. (It is, for example, used by the textbook mentioned by Profs. Goya and Román and other well-known books on inorganic chemistry.) We have therefore agreed on tungsten/tungstide/tungstate.

The last issue is the prefix to be used in the additive chains and rings names already presented in Red Book II.[2] There, that prefix was "wolframy." This nomenclature has not yet been widely adopted, particularly not for transition-metal compounds (where the coordination-type additive names are well-established and usually easily applied), so we decided that the advantage of maintaining the systematic approach and changing the prefix to "tungsty" would outweigh the disadvantage of having to retract from an earlier IUPAC recommendation.

To summarize, Profs. Goya and Román have highlighted an example of having to make non-trivial choices when devising nomenclature recommendations. We believe that if one wishes to control proliferation of alternatives, be as systematic as possible; and at the same time do not ignore prevailing usage in English—the language in which we have agreed to provide our recommendations. We believe we have made the right choices regarding tungsten/wolfram and names derived from these. At the same time, the Spanish, the Danes, and many other nationalities, may happily continue to use wolfram in their locally adapted IUPAC nomenclatures.

References

1. Naming of New Elements, W.H. Koppenol, *Pure Appl. Chem.*, **74**, 787–791 (2002).
2. *Nomenclature of Inorganic Chemistry II, IUPAC Recommendations 2000*. J.A. McCleverty and N.G. Connelly, Royal Society of Chemistry, 2001, chapter II-5.

Ture Damhus (Denmark) is a titular member on both the IUPAC Chemical Nomenclature and Structure Representation Division and the Interdivisional Committee on Terminology, Nomenclature and Symbols.

COMING IN SEPTEMBER

Emerging Issues in Developing Countries

The next article in this continuing series will be "Can Ambiguous Terminology Cause a Barrier to Trade?" by Paul De Bièvre. For a preview and discussion on the subject of Metrological Traceability, join the author and his colleagues of the IUPAC Analytical Chemistry Division in an open workshop during the next General Assembly, on Sunday 14 August at 4 PM.

Remediation Technologies for the Removal of Arsenic from Water and Wastewater

Arsenic currently threatens millions of people in West Bengal, Bangladesh, and Thailand, as a result of their exposure to contaminated groundwater (where concentrations may reach 0.06 mg/L to 1.86 mg/L, a value far in excess of the World Health Organization [WHO] Maximum Permissible Levels). Major problems have also been identified in some areas of the USA, China, and South America.[1,2] The WHO and the U.S. Environmental Protection Agency (EPA) recommended limit for arsenic in drinking water is currently 10 µg/L.[3] It is not so much the difficulty of removing arsenic from water, as the extremely low levels to which it must be reduced to ensure safety, that presents the challenge to water treatment initiatives, especially in developing countries where the issues of cost and expertise often make "high-tech" solutions impractical.

Many extensive reviews of arsenic remediation technologies exist in the literature. However, there remains a need for a simplified and practical guide that condenses the available literature in a form that will allow informed decisions to be made. This project aims to produce a scientifically sound report that will at the same time inform and advise non-specialists on key aspects of arsenic remediation technologies. The report should ideally help people in arsenic affected areas by providing a practical and easy to follow guide, similar to the WHO guide for infectious agents in water.

The guide would advise people in these areas on what steps should be undertaken to mitigate the problem depending on local conditions, including initial arsenic concentrations, arsenic speciation, general water chemistry, and availability of materials and expertise, as well as cost.

The task group will critically evaluate remediation technologies and their possible uses under various conditions. The project will address the transferability of specific technologies that are currently associated with local conditions. As well as making positive recommendations, the work will attempt to predict hazards, complications, and possible failures that may arise from technology transfer between specific field conditions. The project will consider outcomes of remediation technologies in the wider context of overall water quality (e.g., microbiological contamination) rather than just arsenic contamination.

Analytical aspects (i.e., measurement of arsenic in water) are also important for the management of water supplies. Those who use technology to reduce arsenic levels in drinking water should be able to reliably measure and evaluate arsenic concentrations in their supplies. Given the need for relatively simple, but at the same time reliable, measurements, the guide will review and advise on the accuracy, reliability, and overall suitability of currently available field tests kits.

Headed by Hemda Garelick, the task group held their first meeting in January 2005, and the following contributions and tasks have been agreed upon:

1. Introduction—to provide a brief historic overview and comment on the nature and form of arsenic and its changing economic significance to society.
2. Arsenic Pollution Sources—to survey point sources (industrial, mining) and diffuse sources (geochemical, water supply) by categories: natural water (wells, hot springs), industrial (end of pipe), and mining/industrial (diffuse-either from past or current mining activities).
3. Chemical Behavior—to review processes of transformation of arsenic in the environment and their effect on arsenic toxicity (speciation).
4. Testing for Arsenic On Site—to evaluate field test kits in terms of sensitivity, reliability, applicability, and cost.
5. Remediation Technologies and Disposal of Residues—to assess technologies according to type of water treated: potable water, irrigation water, environmental water, and wastewater.
6. Case Studies—to present a collection of representative case studies reported by members of the task group.
7. Summary Recommendations—to provide a decision-making system, supported by information flow from the above aspects.

References

1. www.epa.gov/safewater/ars/arsenic_finalrule.html
2. D.H. Caussy, *The Arsenic Catastrophe in India and Bangladesh—Can it be Solved?* Special seminar report. LSHTM August 2003.
3. P.L. Smedley and D.G. Kinniburgh, *Appl. Geochem.* 17(5), 517–568 (2002).

For more information and comments, contact the Task Group Chairman Hemda Garelick <h.garelick@mdx.ac.uk>.

www.iupac.org/projects/2003/2003-017-2-600.html

Global Availability of Information on Agrochemicals

A tremendous amount of information related to the chemistry of agrochemicals has been generated, which resides not only in the open literature but also in various government and industry files. This information includes reports and recommended approaches developed by IUPAC projects on agrochemicals during the past 20 years. Also included are unpublished reports and technical summaries of information from various advisory bodies, regulatory agencies, and individual agrochemical companies.

However, there is a lack of coordination to make this information widely available to interested regulators and research scientists on a worldwide basis. As a result, decisions at a local level may be made or new research programs initiated without taking into account available information. Thus, the Food And Agriculture Organization of the United Nations and the International Atomic Energy Agency (FAO/IAEA) has initiated a project entitled INFOCRIS (International Food Contaminant and Residue Information System), which will utilize the Internet and CD-ROMs, to make agrochemical information more widely available to scientists in developing countries.

However, the FAO/IAEA currently lacks the capability to populate the data matrix that has been created regarding information on agrochemical properties. Other organizations (e.g., Oregon State University, U.S. Environmental Protection Agency, Pesticide Action Network [PAN]) are independently developing information systems on the Internet. With such a multitude of sites offering information on agrochemicals, there is a need to establish an authoritative site which can ensure the involvement of all information owners in the process.

IUPAC offers the opportunity for an unbiased and authoritative effort based on the collaboration of government, academic, and industry scientists. In addition, IUPAC reports and recommendations related to agrochemicals are poorly known and underutilized, and wider circulation on the Internet will increase the profile and influence of the Union. Finally, access to information on the most recently introduced pesticides tends to be difficult to obtain, and involvement of industry in the IUPAC project will provide access to a major, untapped source of information.

The outcome of this project will increase the global availability of information on the chemistry of agrochemicals, including methods for testing and evaluation, summaries of properties for individual pesticides, and regulatory standards for pesticides.

Meetings and telephone conferences have been held with FAO/IAEA and the INFOCRIS project manager in order to begin cooperation. Based on these communications, it was agreed that some of the tables in the INFOCRIS system should be modified so that they were more closely aligned with the criteria laid down in the project description. These changes were adopted by FAO/IAEA and, thanks to their support, have now been put in place. Consequently, a revised version of INFOCRIS will be available shortly.

Additionally, a meeting was held with members of the IUPAC project titled "A Critical Compendium of Pesticide Physical Chemistry Data" (# 2003-011-3-600) so that information from this project could be utilized. As a result of these meetings, an initial list of 60 agrochemicals has been chosen for inclusion in the INFOCRIS/IUPAC project. Again, thanks to the support of FAO/IAEA, the majority of profiles for these agrochemicals are now being prepared.

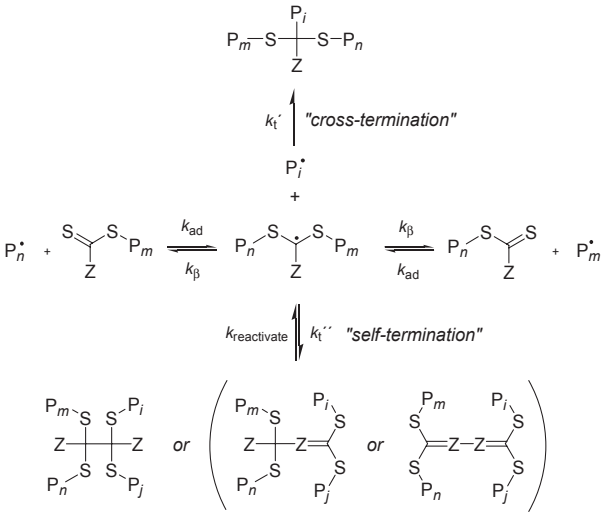
A draft Web page has been proposed and submitted to members of the task group and discussed at a recent meeting of the Advisory Committee on Crop Protection Chemistry in Costa Rica (see Conference Call, p. 34). At this meeting a timetable was agreed upon for the project. The proposed launch for the IUPAC Web page on "Information on Agrochemicals" is the IUPAC Pesticide Congress, which will be held in Kobe, Japan, in August 2006 (See Where 2B & Y, p. 38).

For more information and comments, contact the Task Group Chairman John Unsworth <johnlydiaunsworth@compuserve.com>.

www.iupac.org/projects/2001/2001-022-1-600.html

Towards a Holistic Mechanistic Model for Reversible Addition Fragmentation Chain Transfer (RAFT) Polymerizations

The goals of this project, which emerged from activities of the IUPAC Subcommittee on Modeling of Polymerization Kinetics and Processes, are to develop a detailed understanding of the mechanism of the reversible addition fragmentation chain transfer (RAFT) polymerization and determine the correspon-



The basic RAFT reaction scheme (middle), which induces an equilibrium between propagating radicals, $P_n^{\bullet}$ and $P_m^{\bullet}$, possibly needs to be extended by reversible and/or irreversible termination reactions of the intermediate radical (center) with either another propagating radical, $P_i^{\bullet}$, (upper part) or with itself (lower part) to correctly describe the kinetics of the process.

ding kinetic coefficients. Whereas reliable information about propagation and—at least to some extent—termination rate coefficients for the modeling of radical polymerization processes has been made available by a number of IUPAC projects, the situation is less satisfying with regard to the mechanism and kinetics governing the RAFT process. Although it is widely used for the generation of both complex and well-defined polymeric materials—especially those employing dithioester compounds as the mediating agents—a complete understanding of the fundamental RAFT reaction scheme, which induces the equilibrium between dormant and active radical species, has not yet emerged. A deep understanding of the RAFT process, however, is mandatory to establish structure/rate correlations for a specific RAFT agent, which is essential for rational RAFT agent design delivering novel mediating compounds.

A wide variety of advanced techniques have been applied in recent years to elucidate the mechanism of RAFT polymerization and to arrive at rate coefficients describing the RAFT equilibrium reactions. It has been demonstrated that the choice of the reaction scheme operative in the RAFT process shows a significant influence on the rate coefficients obtained by the experimental methods presently available. In addition, some of the disagreement in the literature may stem from the fact that vastly differing reaction conditions have been employed in the individual studies.

This project aims to improve the currently obscure situation by assembling a team with expertise in free radical polymerization kinetics, mechanism and synthesis, as well as quantum mechanics. The evidence gathered by different scientific groups and experimental results for various RAFT systems will be collated and critically evaluated. The current situation, including common agreement and outstanding inconsistencies, will be assessed in detail. Subsequently, recommendations will be given on how to rationally perform and present future kinetic RAFT experiments to guarantee comparability.

The project aims to formulate a holistic mechanistic model for dithiobenzoate-based RAFT processes of common monomers and to critically evaluate kinetic parameters for dithiobenzoate mediated polymerizations of styrenics, methacrylates, and acrylates. Dithiobenzoates are important RAFT agents for the generation of well-defined polymers, and reasonable kinetic parameters for these mediating agents are of priority to the scientific community.

For more information and comments, contact the Task Group Chairman Philipp Vana <pvana@uni-goettingen.de>.

www.iupac.org/projects/2004/2004-040-1-400.html

Guidelines for Potentiometric Measurements in Suspensions

This project aims to unambiguously define and interpret the suspension effect (SE) on the basis of recent experiments. It will take into account the enormous amount of theoretical and experimental work accomplished in 75 years since the term was first introduced—a period in which no consensus was achieved. On the basis of the recommended definition and interpretation, the significance of potentiometric measurements in suspensions performed in different ways will be explained.

The SE is defined as the difference of the galvanic cell voltage measured with the electrodes (i) in the equilibrium solution of the suspension and (ii) in its sediment. It will be argued that the SE should be regarded as the sum of two effects that occur when the electrodes are immersed in a suspension. These are (i) the transition of the indicator electrode from a reversible potential to an irreversible mixed potential, and (ii) a systematic error of

measurement caused by the outflow of the solution from the reference electrode salt bridge into the suspension.

Due to the irreversible mixed potential of the indicator electrode, which cannot be eliminated in suspension measurements, no thermodynamically exact data can be obtained. Guidelines will be presented for modifications of potentiometric methods applied to suspensions and the significance of these measurements will be interpreted and illustrated.

For more information and comments, contact the Task Group Chairman S.F. Oman <irena.lipar@uni-lj.si>.

www.iupac.org/projects/2004/2004-016-2-500.html

Design of Polymer Education Materials for French-Speaking Countries

The need for a standard in polymer education is recognized and expressed by French-speaking academics of both emerging and developed countries. The aim of this project is to provide the French-speaking countries with a standard for polymer education based on various tools such as books, multimedia, or databases.

The proposed new materials will be elaborated by partners working in separate task groups, each one focusing on a specific medium. The choice of topics to be developed will be made after taking into account the minimum 50-hour program already recommended in France by the French Polymer Group (GFP), which has been active in the production of books for recently nominated teachers. However, these books are only available to GFP members.

The task group for this project includes professors from several European, African, and South American countries. Their work will focus on the production of new books and other media in an effort to provide an effective approach to polymer education in French speaking countries around the world.

It is expected that the materials that will be developed will serve as a standard for the teaching of polymer science at the undergraduate level. The goal of the project is to provide these materials free of charge or at a very low cost, which will certainly be helpful to academics in these countries, but will also help attract more students and foster the discipline.

For more information and comments, contact the Task Group Chairman Gerard Froyer <gerard.froyer@cnrs-imn.fr>.

www.iupac.org/projects/2004/2004-037-1-400.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*.

Graphical Representation of Configuration

The configuration of compounds is determined by the relationship of atoms in three dimensional space, yet chemical structures are most commonly depicted in two dimensional media such as printed publications or computer screens. Recommendations are provided for the display of three-dimensional stereochemical information in two-dimensional diagrams in ways that avoid ambiguity and are likely to be well-understood by all viewers. Examples are provided for all types of stereochemical configuration, with explanation of which styles are preferred and which should be avoided.

Comments by 31 July 2005

Jonathan Brecher
CambridgeSoft Corporation
100 Cambridge Park Drive
Cambridge, MA 02140, USA
Tel.: +1 617-588-9307
Fax: +1 617-588-9380
E-mail: jsb@cambridgesoft.com

www.iupac.org/reports/provisional/abstract05/brecher_310705.html

High-Temperature Mass Spectrometry: Instrumental Techniques, Ionization Cross-Sections, Pressure Measurements, and Thermodynamic Data (IUPAC Technical Report)

Jean Drowart, Christian Chatillon, John Hastie, and David Bonnell

Pure and Applied Chemistry
Vol. 77, No. 4, pp. 683–737 (2005)

Determination of thermodynamic properties at high temperatures for condensed phases, and for gaseous or vapor species, by mass spectrometric (MS) study of vaporization processes has been performed for 50 years. During this period, a number of review papers have appeared describing instruments and experimental procedures in high-temperature mass spectrometry (HTMS). Synopses of the results have also been presented. Data obtained by this technique for individual compounds, whether gaseous or in the condensed phase, are incorporated in tabulations of dissociation energies, of thermodynamic properties, and of ionization potentials. A key aspect of the method is the conversion of primary mass spectral ion intensity data for individual species at specified temperatures to absolute or relative partial pressures.

The purpose of this report is to assess the accuracy and precision of pressures obtained from MS measurements. Attention is paid to the influence of ionization cross-sections and of other factors on such data. The report summarizes experimental, calculated, and estimated cross-sections for ionization of atoms and inorganic molecules typically present in high-temperature vapors.

Experimental cross-sections determined for some 56 atoms are generally close to theoretically calculated values, especially when excitation—autoionization is taken into account. Absolute or relative cross-sections for formation of parent ions were measured for ca. 100 molecules. These include homonuclear diatomic and polyatomic molecules, oxides, chalcogenides, halides, and hydroxides. Additivity of atomic cross-sections supplemented by empirical corrections provides fair estimates of molecular cross-sections. Causes of uncertainty are differences in interatomic distances and in shapes of potential energy curves (surfaces) of neutral molecules and of molecular ions and tendency toward dissociative ionization in certain types of molecules. Various mass spectrometric procedures are described that render the accuracy of measured thermodynamic properties of materials largely independent of ionization cross-sections. This accuracy is comparable with that of other techniques applicable under the conditions of interest, but often only the mass spectrometric procedure is appropriate at high temperatures.

www.iupac.org/publications/pac/2005/7704/7704x0683.html

Chemical Speciation of Environmentally Significant Heavy Metals with Inorganic Ligands. Part 1: The Hg^{2+}- Cl^-, OH^-, CO_3^{2-}, SO_4^{2-}, and PO_4^{3-} Aqueous Systems (IUPAC Technical Report)

Kipton J. Powell, Paul L. Brown, Robert H. Byrne, Tamás Gajda, Glenn Hefter, Staffan Sjöberg, and Hans Wanner

Pure and Applied Chemistry
Vol. 77, No. 4, pp. 739–800 (2005)

This document presents a critical evaluation of the equilibrium constants and reaction enthalpies for the complex formation reactions between aqueous Hg(II) and the common environmental inorganic ligands Cl^-, OH^-, CO_3^{2-}, SO_4^{2-}, and PO_4^{3-}. The analysis used data from the IUPAC Stability Constants database, *SC-Database*, focusing particularly on values for 25°C and perchlorate media. Specific ion interaction theory (SIT) was applied to reliable data available for the ionic strength range $I_c \leq 3.0$ mol dm^{-3}.

Recommended values of $\log_{10} \beta_{p,q,r}$° and the associated reaction enthalpies, $\Delta_r H_m$°, valid at I_m = 0 mol kg^{-1} and 25°C, were obtained by weighted linear regression using the SIT equations. Also reported are the equations and specific ion interaction coefficients required to calculate $\log_{10} \beta_{p,q,r}$ values at higher ionic strengths and other temperatures. A similar analysis is reported for the reactions of H^+ with CO_3^{2-} and PO_4^{3-}. Diagrams are presented to show the calculated distribution of Hg(II) amongst these inorganic ligands in model natural waters. Under typical environmental conditions, Hg(II) speciation is dominated by the formation of $HgCl_2$(aq), Hg(OH)Cl(aq), and $Hg(OH)_2$(aq).

www.iupac.org/publications/pac/2005/7704/7704x0739.html

Crop Protection Chemistry in Latin America

by Elizabeth Carazo

More than 250 scientists, government regulators, and industry leaders representing 28 countries gathered in San Jose, Costa Rica from 14–17 February 2005 to participate in the **IUPAC-UCR-MAG International Workshop on Crop Protection Chemistry in Latin America**. The theme of the workshop was "Harmonized Approaches for Environmental Assessment and Regulation," and a key objective was to encourage exchange of the latest information regarding harmonized approaches for scientific and regulatory evaluation of pesticides in countries throughout Latin America.

The workshop was organized by the Centro de Investigación en Contaminación Ambiental of the University of Costa Rica and the State Phytosanitary Service of the Costa Rica Ministry of Agriculture. Sponsors included CropLife Latin America and the local Costa Rica industry association, Cámara Nacional de Insumos Agropecuarios. Prof. Elizabeth Carazo of the University of Costa Rica led the workshop, and IUPAC contributions were assisted and coordinated by Dr. Ken Racke of the Division of Chemistry and the Environment (DCE).

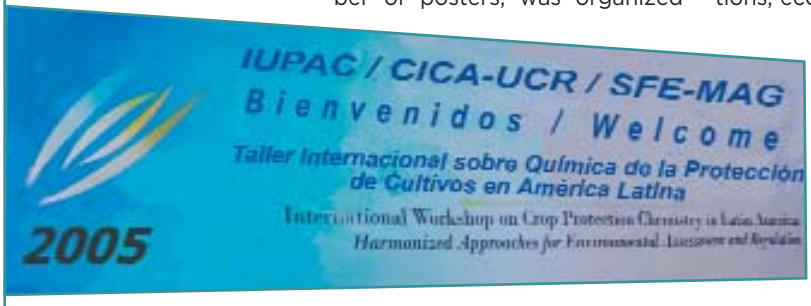
The workshop was organized as part of an IUPAC project of the same title, for which the key objectives are to i) identify and prioritize the main regional issues related to crop protection chemistry and potential environmental impacts in Latin America; ii) facilitate the exchange of information and ideas regarding harmonized approaches for scientific evaluation and regulation of crop protection chemistry; and iii) develop recommendations for advancing crop protection chemistry in Latin America.

The three-day scientific program for the workshop, which included 28 invited lectures and an equal number of posters, was organized around three priority topics related to crop protection chemistry. These included regulatory harmonization, environmental assessment, and residues and human exposure. The program featured 13 lecturers from the IUPAC DCE Subcommittee on Crop Protection Chemistry, who highlighted the findings and recommendations of a number of recently concluded and ongoing IUPAC projects. The workshop attracted a significant amount of media attention and, in addition to articles in leading Costa Rican newspapers, the workshop was covered by the primary local television networks. Several of the media reports featured interviews with invited workshop lecturers.

The IUPAC workshop in Costa Rica was the sixth in a developing series of such chemistry-related, crop-protection workshops organized by the DCE since 1988. Past workshops have been held in Brazil, China, Korea, Taiwan, and Thailand. The papers from the Costa Rica workshop proceedings are available at the link below.

A feature article on the "Advancement of Harmonized Approaches for Crop Protection Chemistry in Latin America," authored by K. Racke, E. Carazo, and G. Roberts, will appear in the Sept.-Oct. 2005 *CI*.

Although the workshop was a great success in terms of participation and the level of scientific information exchange involved, it only represented the second of three objectives for the "Crop Protection Chemistry in Latin America" IUPAC project (#2003-013-1-600). The project also aims to develop recommendations for future advancement of crop protection chemistry in Latin America. Although the results of the workshop are still being evaluated, three preliminary areas of emphasis and future action have so far been proposed: pesticide product specifications, ecological risk assessment, and education.



Elizabeth Carazo <ecarazo@cariari.ucr.ac.cr>, a professor at the University of Costa Rica in San Jose and director of the Centro de Investigación en Contaminación Ambiental, was chair of the local organizing committee. She is project leader for the corresponding IUPAC project <www.iupac.org/projects/2003/2003-013-1-600.html>.

www.iupac.org/symposia/2005/crop-protection-chemistry

Biotechnology

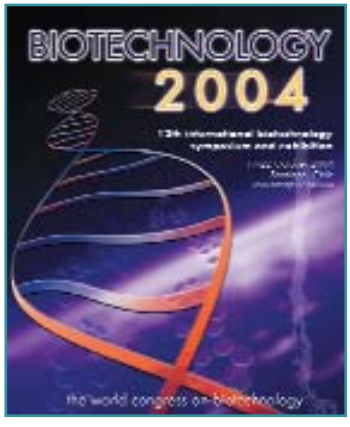
by Juan A. Asenjo and Barbara Andrews

President of Chile Ricardo Lagos (left) greets Congress Chairman Juan A. Asenjo.

More than 500 scientists and specialists from Europe, Asia, Africa, and the Americas participated in the **12th International Biotechnology Symposium and Exhibition**, which was held between 17–22 October 2004 in Santiago, Chile. This well-known event, which is sponsored by IUPAC, is held every four years on a different continent. This symposium is the main international meeting in the rapidly expanding field of biotechnology. This was the first time the conference was held in Latin America.

The 12th IBS was organized by CONICYT, the Comisión Nacional de Investigación Científica y Tecnológica (National Council for Research in Science and Technology) and the Faculty of Physical and Mathematical Sciences of the University of Chile. Sponsors were the International Centre for Genetic Engineering and Biotechnology (ICGEB), Trieste, the Steering Committee on Genetics and Biotechnology of ICSU, and RELAB-Latin American Network of Biological Sciences.

The Organizing Committee divided the program into 10 sections to include many newer areas in the field: Molecular Tools, Cellular Tools, Genomic Tools, Applied Genome Research, Cultivation Technology, Downstream Processing, Biocatalysis, Health Care, Plant and Food Biotechnology, and Environmental Biotechnology. Each section was chaired by two or three internationally recognized leaders in their field, who were given the task of selecting, on the basis of scientific excellence and relevance, lecturers who would present the latest developments in the topic areas. Eight plenary lectures and 32 keynote lectures were presented during four concurrent sessions. A list of lecturers and their topics are available online <www.conicyt.cl/IBS2004>.



The 12th IBS was inaugurated by the President of Chile Ricardo Lagos. He was accompanied by Sergio Bitar, minister of Education; Eric Goles, president of CONICYT; Murray Moo-Young, a representative of IUPAC; and Juan A. Asenjo, Congress chairman.

A welcome reception for all the participants took place at Casapiedra Convention Center on 17 October. A concert and reception was held at the National Library on 19 October. The concert was performed by the Bartok Ensemble, featuring international, Latin American, and Chilean classical music.

An interesting roundtable was held at the congress titled "Biotechnology in the U.S., Europe, the 'Asian Tigers,' South America, and Chile: Innovation, Enterprise, Comparative Advantages, or 'Déjà-Vu'?" The meeting was coordinated by J.A. Asenjo with the participation of Arturo Yudelevich (BiosChile, Chile), Barry Buckland (Merck, USA), Eric Mathur (Diversa Corporation, USA), and Fernando Flores (senator from Chile).

The next International Biotechnology Symposium will be held in China in 2008.

Professor Juan A. Asenjo <juasenjo@ing.uchile.cl>, chairman of the 12th IBS, is director of the Centre for Biochemical Engineering and Biotechnology, Department of Chemical and Biotechnology Engineering, Faculty of Physical and Mathematical Sciences, University of Chile. Professor Barbara Andrews <bandrews@ing.uchile.cl> is deputy director of the Centre for Biochemical Engineering and Biotechnology.

Chemical Sciences in Changing Times: Visions, Challenges, and Solutions

by Teodor Ast

The **4th International Conference of the Chemical Societies of the South-Eastern European Countries (ICOSECS-4)** was held in Belgrade, Serbia and Montenegro, from 18–21 July 2004 at the Faculty of Technology and Metallurgy, University of Belgrade. These conferences have become a biennial event: the first two were held in Halkidiki, Greece (1998 and 2000), and the third in Bucharest, Romania (2002).

ICOSECS-4 was organized by the Serbian Chemical Society on behalf of the Society of Albanian Chemists, Union of Chemists of Bulgaria, Pancyprian Union of Chemists, Association of Greek Chemists, Society of Chemists and Technologists of Macedonia, Chemical Society of Montenegro, and the Romanian Chemical Society.

The theme of the conference was "Chemical Sciences in Changing Times: Visions, Challenges and Solutions." The conference featured contributions from all areas of chemistry. However, the main focus was reflected in three symposia:

- Advanced Materials: From Fundamentals to Application
- The Greening of Chemistry: Pursuit of a Healthy Environment and Safe Food
- Teaching and Understanding Chemistry: New Concepts and Strategies for Changing Times (Dedicated to 150 years of teaching chemistry in Serbia)

The meeting was organized under the auspices of IUPAC, the Federation of European Chemical Societies (FECS), the Ministry of Science and Environmental Protection of Serbia, and the Organization for the Prohibition of Chemical Weapons. The president of IUPAC, Leiv Sydnes, and the president of FECS, Gabor Naray-Szabo, attended the conference and addressed the participants.

Some 600 researchers from 26 countries took part in the conference. One of the reasons for such a large attendance was because organizers of these conferences (the chemical societies of South-East Europe) have declared a commitment to keeping the registration fees as low as possible.

The scientific program featured five plenary lectures:

- John Fenn, Virginia Commonwealth University, Richmond, USA, the 2002 Nobel Laureate, "Electrospray Wings for Molecular Elephants"
- Peter Atkins, Oxford University, Oxford, UK, "Modern Trends in Chemical Education"
- C.N.R. Rao, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India, "New Directions in the Chemical Design of Materials"
- Egon Matijevic, Clarkson University, Potsdam, USA, "Mechanisms of Formation of Uniform Fine Particles and Their Applications"
- Ivano Bertini, University of Florence, Florence, Italy, "From Genomes to Cellular Mechanisms and Drug Design"

In addition to the plenary lectures, the program included 38 invited lectures and 25 oral and 437 poster presentations. Brief summaries of all contributions were published in a two-volume book of abstracts.

A rich social program included a welcome reception in the historic City Hall featuring a recital by the Simonuti Trio, a boat sightseeing tour of Belgrade, and a conference dinner with live music and dancing.

It was decided that the next conference, ICOSECS-5, will be organized by the Society of Chemists and Technologists of Macedonia in 2006.

Professor Teodor Ast <ast@tmf.bg.ac.yu> served as chairman of the International Scientific Committee of ICOSECS-4. He is the president of the Union of Yugoslav Chemical Societies.

XI International IUPAC Symposium on Mycotoxins and Phycotoxins

by Douglas L. Park

The series of **International Symposia on Mycotoxins and Phycotoxins**, initiated by the IUPAC Food Chemistry Commission, began in Kungalv, Sweden, in 1973. Since then, nine symposia have been held in Pulawy, Poland; Paris, France; Lausanne, Switzerland; Vienna, Austria; Pretoria, South Africa; Tokyo, Japan; Mexico City, Mexico; Rome, Italy; and Guaruj, Brazil. The symposia have become the principal international interdisciplinary meetings on mycotoxins and phycotoxins.

The 11th symposium was held in May 2004 at the Natcher Center of the National Institutes of Health in Bethesda, Maryland, USA. Over 300 participants from

41 countries were present for 63 oral presentations (52 presentations on mycotoxins and 11 on phycotoxins) by internationally recognized speakers. In addition, 127 posters were on display (116 on mycotoxins and 11 on phycotoxins). The focus of the oral sessions included Ecology and Biodynamics, Toxicology and Health Effects, Prevalence of Known and New Toxins, Advances in Analytical Methods, and Advances in Preventative Intervention.

Keynote speaker Maya Pineiro (FAO, Italy), speaking for Ezzeddine Boutrif (FAO), addressed the importance of mycotoxins and phycotoxins on the global perception of food safety. Key topics at the symposium included regulations, risk assessment, and applications of methodologies for economically challenged regions.

A number of presentations provided insight and cutting-edge concepts, including "New Technologies for Predicting Risk: the Impact of the Advent of the 'Omics'," by Daniel Casciano from the National Center for Toxicology Research, Food and Drug Administration, USA. During his talk, he introduced the term "systeomic" to the audience and indicated that this new approach would result in the reduction in animal use and resolve the value of non-invasive techniques in animal and human research, including mycotoxins and phycotoxins.

Other presentations focused on reducing fungal infections and mycotoxin levels in crop plants in the field and in storage, as well as the establishment of regulations, as presented by Walter F.O. Marasas, Medical Research Council of South Africa, and Hans van Egmond, National Institute of Public Health and the Environment, Netherlands. Felicia Wu (University of Pittsburgh, PA, USA) pointed out that the implications of both health and economic outcomes are important for policymakers to consider when developing international standards for mycotoxins. In the area of phycotoxins, Sherwood Hall (U.S. FDA) offered an insightful presentation indicating that optimizing seafood safety requires finding a balancing point between detection methods that may be more accurate or sensitive and those that are simpler and faster that would be more likely to be reliably performed at an adequate frequency, given the temporal and spatial density required for effective monitoring.

During the symposium, an announcement was made concerning a possible significant aflatoxicosis poisoning outbreak that was unfolding in Kenya due to aflatoxin contaminated maize. In the subsequent weeks, it was found that over 300 cases of poisoning were reported, with 125 deaths.

One of the reasons for rotating this meeting to different locations worldwide was to allow for local issues to be addressed in the area of mycotoxins and phycotoxins. This is why it was decided during the meeting that the XII International IUPAC Symposium on Mycotoxins and Phycotoxins will be held in Istanbul, Turkey, in 2007. There has not been a symposium of this magnitude in the Middle East, and the problems of mycotoxins and phycotoxins in this economically challenged area of the world can be addressed more adequately once the meeting is held. For more information, please contact Hamide Senyuva <hsenyuva@tubitak.gov.tr>.

Aflatoxins are produced by different species of Aspergillus, particularly flavus and parasiticus, as well as members of the Genera Penicillium and Rhizopus. Strains of Aspergillus flavus and parasiticus produce mycotoxins under favorable conditions. Aflatoxins can contaminate corn, cereals, sorghum, peanuts, and other oil-seed crops.

During the last day of the symposium, a follow-up session was held for the participants of the 2002 International Workshop on Mycotoxins. Ten presentations were made by scientists from economically challenged nations that previously participated in the workshop (three from Latin America, three from Africa, three from Asia, and one from Europe). They described significant progress in the establishment of training opportunities, as well as the practical application of mycotoxin management programs.

The editorial committee of the symposium is preparing the proceedings, with a target date for publication in the second half of 2005. For more information, please contact Dr. Henry Njapau <hnjapau@cfsan.fda.gov> regarding the book of abstracts or the proceedings.

Douglas L. Park <dpark@cfsan.fda.gov>, chairman of the organizing committee, is the director of the Division of Natural Products, Center for Food Safety and Applied Nutrition, FDA, USA. He is a member of several international organizations in the area of mycotoxins.

Where 2B & Y

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

Metallothionein

8–12 October 2005, Beijing, China

The **5th International Conference on Metallothionein** will be held in Beijing, China, 8–12 October 2005. The theme of this meeting will be on "Metals and Metallothionein in Biology and Medicine." The four previous meetings in this series were held in Switzerland, Japan, and the USA. This meeting, which will be held under IUPAC auspices, will address most of the recent findings on the structure and biological functions of metallothionein, along with studies on metals, especially on oxidative stress, gene expression, signal transduction pathways, carcinogenesis, cardiovascular diseases, diabetes, and Alzheimer's disease. Topics related to toxicology and control of metal pollution in soil and water will also be covered. This conference will provide an opportunity to bring together scientists from both academia and industry to communicate their recent findings and establish collaborations with Chinese colleagues.

The conference organizers are Dr. Binggen Ru, Peking University, China <rulab@pku.edu.cn>, and Dr. M. George Cherian, University of Western Ontario, Canada <mcherian@uwo.ca>.

See Mark Your Calendar on page 43 for contact information.

www.mt-2005.org

Chemistry for Agriculture

6–9 December 2005
Jesenik, Czech Republic

The **XXXI International Conference "Chemistry for Agriculture"** will be held 6–9 December 2005 at the famous health resort Priessnitz in Jesenik, Czech Republic. The chairman of the conference is Henryk Gorecki (Polish Ministry of Science and Information Society Technologies). The chairman of the Organizing Committee is Adam Pawelczyk (Wroclaw University of Technology, Poland).

The conference will present scientific achievements obtained from various interdisciplinary research projects dealing with chemicals used in agriculture. The conference program will cover the following topics:

- chemistry—basic research
- chemical technology—mineral fertilizers, feed phosphates, and other additives
- agricultural chemistry—fertilizer nutrients' changes in the soil, nutrient availability
- phosphorus and nitrogen problems in the environment
- ecotoxicology—selected problems
- new production technologies
- new methods for applying agricultural chemicals
- impact of chemical products on plant and animal production
- harmful substances in agriculture and the environment

The conference is a unique forum for specialists from different disciplines to exchange ideas and develop new concepts.

See Mark Your Calendar on page 43 for contact information.

Pesticide Chemistry

6–11 August 2006, Kobe, Japan

The **11th IUPAC International Congress of Pesticide Chemistry** will be held in Kobe, Japan, 6–11 August 2006. The congress, which has as its theme "Evolution for Crop Protection, Public Health, and Environmental Safety," aims to bring together scientists who study chemistry, biology, and environmental health issues from all over the world in order to present technical achievements and exchange opinions about pesticide chemistry and bioscience. The sessions will include plenary and session lectures, luncheon and evening seminars, and poster presentations and discussions. Please visit the congress Web site for more detailed information.

See Mark Your Calendar on page 44 for contact information.

www.iupac2006.jtbcom.co.jp

Analytical Sciences

25–30 June 2006, Moscow, Russia

The **International Congress on Analytical Sciences (ICAS-2006)** will take place 25–30 June 2006 in Moscow, Russia. The aim of the congress is to allow analytical chemists from around the world the opportunity to establish contacts, stimulate collaboration, and exchange experiences.

At the previous ICAS meeting (ICAS 2001), organized by the Japan Society for Analytical Chemistry and IUPAC, over 900 papers by analytical chemists from many countries were presented. Following the traditions of the ICAS meetings, emphasis will be placed on new developments and applications in the analytical sciences. Invited plenary lectures, keynote lectures, and contributed papers will be presented.

The organizer of ICAS-2006 is the Russian Academy of Sciences. The congress is being organized in cooperation with IUPAC, Division of Analytical Chemistry of the European Association for Chemical and Molecular Sciences, and Co-Operation on International Traceability in Analytical Chemistry (CITAC).

The large and convenient Congress Hall of the Academy will host ICAS-2006. An exhibition of analytical instruments, equipment, and publications will

be held during the congress. In addition, a workshop on metrology and quality assurance in analytical chemistry (in cooperation with CITAC) will be held during the congress.

An attractive social program, including visits to Moscow theatres, concert halls, and museums will be offered. European standard hotels at reasonable prices and accommodations for young participants will be available.

See Mark Your Calendar on page 44 for contact information.

www.icas2006.ru

Chemical Education

12–17 August 2006, Seoul, Korea

The **19th International Conference on Chemical Education (19th ICCE)** is being organized by the Korean Chemical Society. The conference, the theme of which will be "Chemistry and Chemical Education for Humanity," will provide opportunities for chemists, chemical engineers, chemistry educators, and related specialists to share and exchange their experiences and expertise related to chemical education and the benefits of chemistry.

The conference will cover the following topics:

- Biochemistry and Biotechnology
- Chemical Industry and Chemistry Education
- Chemistry in Developing Countries
- Chemistry in Secondary Schools
- Chemistry Teacher Education
- Chemistry to Societal Needs
- Demonstration of Chemistry
- Fusion of Modern Technologies for Chemistry Education
- Green Chemistry and Environment-Friendly Chemistry
- Microscale Laboratory Technique
- Multimedia and Visualization for Chemistry Education
- Polymer Education
- Public Understanding of Chemistry
- Role of Chemists
- Science Education at Elementary Level
- The Future of Chemistry Textbooks
- Use of Arts in Chemical Education
- Web-Based Learning and Teaching

See Mark Your Calendar on page 44 for contact information.

www.19icce.org

Coordination Chemistry

13–18 August 2006
Cape Town, South Africa

For the first time since the inception of the International Conference on Coordination Chemistry series of conferences in 1950, the 37th ICCC will be held in Cape Town, South Africa from 13–18 August 2006. It is hoped that this conference, to be held at the International Convention Centre in the heart of the city, will bring the single largest group of inorganic and coordination chemists in history to South Africa.

The South African economy is very dependent on the mining and refinement of its extensive mineral resources. South Africa is the world's largest producer of platinum metals and a major supplier of gold and other important minerals. At the heart of the production of pure metals lies coordination chemistry. Therefore, the 37th ICCC in South Africa can help to stimulate the development of this science across the African continent.

Immediately after the 37th ICCC, an associated meeting, the 15th International Symposium on Homogeneous Catalysis, will be held at Sun City in the North-Western Province, South Africa, from 20-25 August 2006.

The full scientific program will comprise a number of themes in modern coordination chemistry. A number of renowned coordination chemists have agreed to present plenary lectures: A P de Silva (Northern Ireland), Robert Grubbs (USA), Tobin Marks (USA), Helder Marques (South Africa), Kazuko Matsumoto (Japan), Peter Sadler (UK), and Omar Yaghi (USA).

See Mark Your Calendar on page 44 for contact information.

http://webhost.sun.ac.za/pgm_group/intro.htm

High Temperature Materials

18–22 September 2006, Vienna, Austria

The **XII International IUPAC Conference on High Temperature Materials Chemistry (HTMCXII)**, the latest in a series held every three years, will be held 18–22 September 2006 at the Technical University of Vienna, Austria. The conference chairmen are Adolf Mikula and Herbert Ipser from the University of Vienna and Ulrich Schubert from the Technical University of Vienna.

The conference will focus on new developments in high temperature chemistry in various fields of material science. The conference will feature the following main topics:

- Experimental Thermodynamics and Modelling
- Ecomaterials/Special Materials
- Lamp Chemistry
- Structure and Dynamics of High Temperature Materials
- High Temperature Liquid Phase Chemistry
- Non-Oxidic High Temperature Ceramics
- Lanthanides and Actinides, Nuclear Applications
- High Temperature Intermetallics/Superalloys
- Lead-Free Soldering

See Mark Your Calendar on page 44 for contact information.

www.univie.ac.at/htmc06

Visas

It is a condition of sponsorships that organizers of meetings under the auspices of IUPAC, in considering the locations of such meetings, should take all possible steps to ensure the freedom of all bona fide chemists from throughout the world to attend irrespective of race, religion, or political philosophy. IUPAC sponsorship implies that entry visas will be granted to all bona fide chemists provided application is made not less than three months in advance. If a visa is not granted one month before the meeting, the IUPAC Secretariat should be notified without delay by the applicant.

Thieme Publishers and IUPAC in collaboration with the editors of SYNTHESIS · SYNLETT · SCIENCE OF SYNTHESIS · HOUBEN–WEYL announce the

2006 Thieme–IUPAC Prize in Synthetic Organic Chemistry

Call for Nominations

The Thieme–IUPAC Prize is presented every two years on the occasion of the International Union of Pure and Applied Chemistry – International Conference on Organic Synthesis (IUPAC–ICOS). The 2006 ICOS will be held in Mérida, México, on June 11–15. The prize is awarded to a scientist under 40 years of age whose research has had a major impact in synthetic organic chemistry.

Prize € 5000

The Thieme–IUPAC Prize has been awarded to Stuart L. Schreiber in 1992, Paul Knochel in 1994, Eric N. Jacobsen in 1996, Andrew G. Myers in 1998, Alois Fürstner in 2000, Erick M. Carreira in 2002, and John Hartwig in 2004.

The prize will be awarded on the basis of scientific merit for independent research dealing with synthesis in the broadest context of organic chemistry, including organometallic chemistry, medicinal and biological chemistry, designed molecules, and materials. Candidates must be under 40 years of age as of January 1 of the year in which the prize is awarded.

Proposals must be accompanied by a biographical sketch of the nominee, a list of the candidate's ten most significant publications, and a statement of how the candidate's research has had a major impact on the field of synthetic organic chemistry. The material will be confidentially forwarded to an independent selection committee.

Deadline: December 9, 2005

For further information please visit www.thieme-chemistry.com

ICOS-16
Mérida, México, June 11-15, 2006

ICOS-16
June 11–15, 2006
Mérida, México

Nomination materials (8 copies)

should be submitted by December 9, 2005 to

Marcus White
Georg Thieme Verlag
Ruedigerstr. 14
70469 Stuttgart
Germany

Telephone:
+49 (711) 8931 880

Fax:
+49 (711) 8931 777

E-mail:
marcus.white@thieme.de

Thieme

Mark Your Calendar

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

2005 *(later than 25 July)*

IUPAC poster prizes to be awarded

26–29 July 2005 • Polymer Science and Technology • Fukuoka, Japan
The 8th SPSJ International Polymer Conference (IPC 2005)
Prof. Mitsuo Sawamoto, Department of Polymer Chemistry, Kyoto University, Graduate School of Enginerring, Katsura, Nishikyo-ku, Kyoto 615-8510, Japan, Tel.: +81 75 383 2600, Fax: +81 75 383 2601, E-mail: sawamoto@star.polym.kyoto-u.ac.jp

31 July–5 August 2005 • Heterocyclic Chemistry • Palermo, Italy
20th International Congress of Heterocyclic Chemistry
Prof. Girolamo Cirrincione, Dipartimento Farmacochimico Toss. E Biol., Università degli Studi di Palermo, Via Archirafi 32, I- 90123 Palermo, Italy, Tel.: +39 0916161606, Fax: +39 0916169999, E-mail: gcirrinc@unipa.it

7–12 August 2005 • Plasma Chemistry • Toronto, Ontario, Canada
17th International Symposium on Plasma Chemistry
Prof. Javad Mostaghimi, Faculty of Applied Science and Engineering, University of Toronto, 40 St. George Street, Room 8260, Toronto ON M5S 1A4, Canada, Tel.: +1 416 978 5604, Fax: 1 416 978 7753, E-mail: mostag@me.utoronto.ca

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
<www.iupac.org/symposia/conferences/ga05>

Check the Web for Schedule
—President's Address, Sat. 13 Aug. at 19:00
—Open Workshop on Metrological Traceability, Sun. 14 Aug. at 16:00
—and much more

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

14–18 August 2005 • Novel Aromatic Compounds • St. John's, Newfoundland, Canada
11th International Symposium on Novel Aromatic Compounds (ISNA-11)
Dr. Graham Bodwell, Department of Chemistry, Memorial University of Newfoundland, St. John's NL, Canada, Tel.: +1-709-737-8406, Fax: +1-709-737-3702, E-mail: gbodwell@mun.ca

21–25 August 2005 • Solution Chemistry • Portoroz, Slovenia
International Conference on Solution Chemistry
Prof. Vojko Vlachy, Faculty of Chemistry and Chemical Technology, University of Ljubljana, Aškerceva 5, POB 537, SL 1001 Ljubljana, Slovenia, E-mail: vojko.vlachy@uni-lj.si

30 August–3 September 2005 • Learning Science • Barcelona, Spain
European Science Education Research Association—"Contributions of Research to Enhancing Students' Interest in Learning Science"
Dr. Roser Pinto, CRECIM Centre de Recerca per a l'Educacio Cientifica i Matematica, Campus de la UAB-Edifici G5, E-08193 Bellaterra, Barcelona, Spain, Tel.: +34 93 5813206, Fax: +34 93 5811169, E-mail: roser.pinto@uab.es

4–9 September 2005 • Analytical Spectroscopy • Antwerp, Belgium
Colloquium Spectroscopicum Internationale XXXIV
Prof. Rene Van Grieken, Department of Chemistry, University of Antwerp, B-2610 Antwerp, Belgium, Tel.: +32 3 820 2362, Fax: +32 3 820 2376, E-mail: rene.vangrieken@ua.ac.be

5–9 September 2005 • Nanostructured Advanced Materials • Stellenbosch, South Africa
3rd IUPAC Workshop on New Directions in Chemistry—Workshop on Nanostructured Advanced Materials (WAM III)
Prof. R.D. Sanderson, University of Stellenbosch, Department of Chemistry & Polymer Science, Private Bag X1, Matieland 7602, South Africa, E-mail: rds@sun.ac.za

10–13 September 2005 • Macromolecule-Metal Complexes • Tirrenia (Pisa), Italy
11th IUPAC International Symposium on Macromolecule-Metal Complexes (MMC-11)
Prof. Francesco Ciardelli, Chemistry and Industrial Chemistry Department, University of Pisa, via Risorgimento, 35, I-56126 Pisa, Italy, Tel.: +39 0502219229, Fax: +39 0502219320, E-mail: fciard@dcci.unipi.it

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

12–18 September 2005 • Analytical Chemistry • Kiev, Ukraine
International Congress on Analytical Chemistry and Chemical Analysis (AC&CA-05)
Prof. Vladimir Zaitsev, Chemistry Department, Kiev National University, 60 Vladimirskaya, Kiev 01033, Ukraine, Tel.: +380 44-2393345, Fax: +380 44-2393345, E-mail: zaitsev@univ.kiev.ua

13–16 September 2005 • Polymers for Advanced Technologies • Budapest, Hungary
8th International Symposium Polymers for Advanced Technologies
Prof. Gyorgy Marosi, Budapest University of Technology and Economics, Department of Organic Chemical Technology, Muegyetem rkp. 3, H-1111 Budapest, Hungary, Tel.: +36 1 4633654, Fax: +36 1 4631150, E-mail: pat@mail.bme.hu

8–12 October 2005 • Metallothionein • Beijing, China
5th International Conference on Metals and Metallothionein in Biology and Medicine
Prof. M. George Cherian, Department of Pathology, University of Western Ontario, London, Ontario N6A 5C1 Canada, Tel.: +1 519-661-2030, Fax: +1 519-661-3370, E-mail: mcherian@uwo.ca

17–21 October 2005 • Radiochemistry • Beijing, China
Third Asia-Pacific Symposium on Radiochemistry (APSORC '05)
Prof. Z. F. Chai, Institute of High Energy Physics, Chinese Academy of Sciences, Yu Quan Rd. 19B, P.O. Box 918 Beijing 100039, China, Tel.: +86 10 8823 3191, Fax: +86 10 8823 3191, E-mail: apsorc2005@ihep.ac.cn

23–28 October 2005 • Ionic Polymerization • Goa, India
International Symposium on Ionic Polymerization
Prof. S. Sivaram, National Chemistry Laboratory, Polymer Chemistry Division, Dr. Homi Bhabha Road, Pune, Maharashtra, 411 008 India, Tel.: +91 20 2589 3030, Fax: +91 20 2586 3355, E-mail: sivaram@ems.ncl.res.in

December 2005 • Arsenic Remediation • Dhaka, Bangladesh
Bangladesh Workshop on Origins and Remediation of Groundwater Contamination by Arsenic
Dr. Satinder Ahuja, Novartis Corporation (retired), 1061 Rutledge Court, Calabash, NC 28467 USA, Tel.: +1 910 287-2765, E-mail: sutahuja@xaranda.net

6–9 December 2005 • Agriculture • Jesenik, Czech Republic
XXXIth International Conference - 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

2006

IUPAC poster prizes to be awarded

10–13 January 2006 • Green Chemistry • Delhi, India
Second International Symposium on Green/Sustainable Chemistry
Prof. M. Kidwai, Department of Chemistry, University of Delhi, Delhi-110007, India, Fax: +91 11 27666235, E-mail: kidwai_chemistry@yahoo.co.uk

12–15 March 2006 • Heterocyclic Chemistry • Gainesville, Florida, USA
7th Florida Heterocyclic Conference
Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, Gainesville, FL 32611-7200, USA, Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

2–7 April 2006 • Photochemistry • Kyoto, Japan
XXIst IUPAC Symposium of Photochemistry
Prof. Masahiro Irie, Department of Chemistry and Biochemistry, Kyushu University, Graduate School of Engineering, Hakozaki 6-10-1, Fukuoka, Japan, Tel.: +81 92 642 3556, Fax: +81 92 642 3568, E-mail: irie@cstf.kyushu-u.ac.jp

Mark Your Calendar

11–15 June 2006 • Organic Synthesis • Merida, Yucatan, Mexico
16th International Conference on Organic Synthesis (ICOS 16)
Dr. Eusebio Juaristi, Instituto Politecnico Nacional, Departamento de Quimica, Avenida IPN #2508, Esquina Ticoman, Mexico City, DF, 07360, Mexico, Tel: +52 55 50613722, Fax: +52 55 57477113, E-mail: juaristi@relaq.mx

25–30 June 2006 • Analytical Sciences • Moscow, Russia
International Congress on Analytical Sciences
Prof. Vladimir P. Kolotov, Vernadsky Institute of Geochemistry, Russian Academy of Sciences, 19, Kosygin Str., Moscow B-334 119991 Russia, Tel.: +7 (095) 137 04 86, Fax: +7 (095) 938 20 54, E-mail: kolotov@geokhi.ru

6–11 August 2006 • Pesticide Chemistry • Kobe, Japan
11th International Congress of Pesticide Chemistry
Dr. Hisashi Miyagawa, Division Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan, Tel.: +81 75 753 6118, Fax: +81 75 753 6123, E-mail: miyagawa@kais.kyoto-u.ac.jp

12–17 August 2006 • Chemical Education • Seoul, Korea
19th International Conference on Chemical Education
Prof. Choon H. Do, Sunchon National University, Department of Polymer Science and Engineering, 315 Maegok-dong, Sunchon,, Chonnam 540-742, Korea, Tel.: +82 61 750 3565, Fax: +82 61 750 3565, E-mail: choondo@sunchon.ac.kr

13–18 August 2006 • Coordination Chemistry • Cape Town, South Africa
37th International Conference on Coordination Chemistry
Prof. K.R. Koch, Department of Chemistry, Univsersity of Stellenbosch, Private Bage X1 Matieland, Stellenbosch 7602, South Africa, Tel.: +[27] 21 808 3020, Fax: +[27] 21 808, E-mail: krk@sun.ac.za

18–22 September 2006 • High Temperature Materials • Vienna, Austria
12th International Conference on High Temperature Materials Chemistry (HTMC XII)
Prof. Dr. Adolf Mikula, Wahringstr. 42, A-1090 Vienna, Austria, Tel.: +43 4277 52606, Fax: +43 4277 52679, E-mail: Adolf.Mikula@univie.ac.at

16–20 October 2006 • Chemistry for Life • Havana City, Cuba
27th Latin American Congress on Chemistry and 6th International Congress of Chemistry and Chemical Eng.
Prof. Alberto J. Núñez Sellés, Center of Pharmaceutical Chemistry, Sociedad Cubana de Quimica, Ave 21 & 200, Rpto. Atabey, Apdo. 16042 Havana, CP 11600, Cuba, Tel.: +53 7 218 178, Fax: +53 7 273 6471, E-mail: alberto@cgf.co.cu

2007

IUPAC poster prizes to be awarded

21–25 May 2007 • Mycotoxins and Phycotoxins • Istanbul, Turkey
XIIth International Symposium on Mycotoxins and Phycotoxins
Dr. Hamide Z. Senyuva, Tubitak-Atal, Konya Yolu No. 67, Besevler, 06530, Ankara, Turkey, Tel.: +90 312 2124620/ext.14, Fax: +90 312 2123749, E-mail: hamide.senyuva@tubitak.gov.tr

22–27 July 2007 • Novel Aromatic Compounds • Tsuna-Gun, Japan
12th International Symposium on Novel Aromatic Compounds (ISNA-12)
Prof. Yoshito Tobe, Division of Frontier Materials Science, Osaka University, Toyonaka, Osaka University, Japan, Tel.: +81 6 6850 6225, Fax: +81 6 6850 6229, E-mail: tobe@chem.es.osaka-u.ac.jp

2–6 August 2007 • Organometallic Chemistry • Nara, Japan
14th International Symposium on Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS-14)
Prof. Kazuhiko Takai, Dept. of Applied Chemistry, Okayama University, Faculty of Engineering, Tsushimanaka 3-1-1, Okayama 700-8530, Japan, Tel.: +81 86 251 8097, Fax: +81 86 251 8094, E-mail: ktakai@cc.okayama-u.ac.jp

4–12 August 2007 • IUPAC 44th General Assembly • Turino, Italy
IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org

5–11 August 2007 • IUPAC 41st Congress • Turino, Italy
Chemistry Protecting Health, Natural Environment, and Cultural Heritage
E-mail: IUPAC.2007@unito.it

International Union of Pure and Applied Chemistry

Advancing the worldwide role of chemistry for the benefit of Mankind

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

National Adhering Organizations

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

IUPAC CONGRESS 2007

44th IUPAC General Assembly,
Torino (Italy), August 4-12, 2007

41st IUPAC World Chemistry Congress,
Torino (Italy), August 5-11, 2007

41st IUPAC World Chemistry Congress

Chemistry Protecting Health, Natural Environment and Cultural Heritage



IUPAC 2007 PROMOTERS

Consiglio Nazionale delle Ricerche
Società Chimica Italiana
Università degli Studi di Torino
Politecnico di Torino
Università degli Studi del Piemonte Orientale
Istituto Nazionale di Ricerca Metrologica

IUPAC.2007@unito.it