From the Editor

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

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It was just another day at school for Rikako, who is 10 years old and lives in Japan. With her colorful clothes, her lunch bag packed with snacks and fruit, she went about her day, most likely without thinking much about the world around her.

But for that day's activity, Rikako's teacher planned for the students to draw and paint on a subject that is all around them: chemistry. "Why chemistry?" the students probably thought. The teacher explained to them that there was a poster contest on the theme of "**It's a chemical world**." "Have you ever thought that we live in a chemical world?" the teacher asked. "How much chemistry do you think is going into the materials around you, the plastics and paints, into the medicines, into the fuel used to generate energy, into the food and the preservatives?" Without saying more, the teacher let them come forward with ideas that reflected how they perceived the world around them, and how chemistry affected it.

Rikako and her schoolmates were not alone as they scratched their chins while thinking of something to draw. Last spring, about 400 young students from around the world submitted works to the poster contest initiated by IUPAC and managed in collaboration with Science Across the World (SAW). The children were not all as young as Rikako; in fact, the contest called for students as old as 16.

This initiative of the IUPAC Subcommittee on the Public Understanding of Chemistry (PUC) benefited from the energy and enthusiasm of its chairman Peter Mahaffy and member Lida Shoen. The effort was driven by the conviction that if the chemistry community is to improve its image and popularity, the discipline itself must help the public to understand what it does and how it contributes to everyone's everyday life. Therefore, PUC wanted to start by learning how young people perceive living in a chemical world. A poster contest seemed a perfect fit, and with the support of SAW and the help of Kathy Darvesh from the Canadian Society for Chemistry, they pulled off an amazing display of about 25 posters during the IUPAC Congress in Ottawa in August 2003.

For those who missed the display in Ottawa, we offer a few pages in this issue to show the 10 winning entries—see page 4. Rikako, the youngest winner, recognized that chemistry is in the dyes of her dress and the drugs and food that make her healthy. But to the eyes of others, chemistry is also part of the problem; for example, using and abusing nature by producing non-recyclable plastics and chemicals that deplete the ozone layer and make acid rain. Now that we have the posters before us, it is for us adults to think about our message to the youth of this world. A few among them will be tomorrow's chemists, but we need to convince more than a few that science and chemistry are keys to making this world a better place to live.

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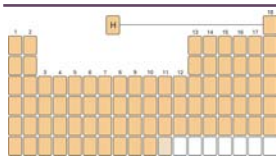


President's Column

Pursuing Our Long-Range Goals

by Piet Steyn

The IUPAC Congress and General Assembly, held this past August in Ottawa, Canada, provided an excellent opportunity to reflect on the progress we have made in the past two years, thank those who have made exceptional contributions, and discuss changes we would like to institute as we look to the future. The scientific work of IUPAC is now focused on the ever-changing needs of the global chemical community. The new project approval system continues to be effective, and there is increasing focus on chemistry and its impact on society, as well as on chemistry education.

The *Union Strategic Plan* highlights six long-range goals that guide the Union activities while it fulfills its mission. In my report on the State of the Union,* I assessed IUPAC's progress toward each of these goals. Here I will mention only a limited selection of the many and varied examples of how IUPAC is meeting these goals.

Two major projects in 2002 and 2003 exemplify how IUPAC continues to be a leader in addressing global issues involving the chemical sciences. First, we provided essential advice to the Organization for the Prohibition of Chemical Weapons on the impact of scientific advances on the Chemical Weapons Convention. The second example is the international symposium that IUPAC and ICSU held in November 2002 in Japan, which examined the environmental implications of endocrine active substances.

IUPAC is clearly making progress in its goal of facilitating the advancement of chemical research by providing the tools for international standardization and scientific discussion. As noted in the September issue of *Chemisty International*, the IUPAC Council officially approved the name darmstadtium, and the symbol Ds, for the element of atomic number 110, after the proposal was recommended by the Inorganic Chemistry Division.

By adopting a new system for managing projects, IUPAC has created new opportunities for advancing chemical research. Since the beginning of 2002 IUPAC has operated under a project system, through which proposals are actively solicited from within the Union as well as from chemists not directly involved with IUPAC. In 2002, 75 projects were approved, an indication of the awareness and effectiveness of the project system.

Another important goal of IUPAC is to assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life. This task falls primarily to our Committee on Chemistry and Industry (COCI), chaired by Dr. Wright, which continues successful projects such as holding safety workshops (see July 2003 *CI*), and a fellowship program in safety training (see page 12). In addition, IUPAC meets its commitment to education through its Committee on Chemistry Education (CCE), which was created at the beginning of 2002. The CCE focuses mainly on improving chemistry education in the developing world and enhancing public understanding of chemistry. The CCE has proved tremendously popular with over three dozen members thus far.

Over the past two years, IUPAC has made great strides toward its goal of fostering communication among individual chemists and scientific organizations . . .

Over the past two years, IUPAC has made great strides toward its goal of fostering communication among individual chemists and scientific organizations, with special emphasis on the needs of chemists in developing countries. Our electronic and printed communications are areas in which we've seen major advancements: *Pure and Applied Chemistry* and *CI* are now available online, e-mail has become the preferred vehicle for communication, the IUPAC Web site has become a resounding success with more than 300 000 hits per month, and the e-news has developed into a regular e-mail news alert. In addition, IUPAC has improved communication by enhancing the utility of *PAC* and *CI*. The increasing focus on special topics issues in *PAC* has proved to be very popular and the new design and organization of *CI* has enhanced its readability.

*IUPAC Statute 6.23 requires that the president submit to each regular meeting of the Council a report on the general state of the Union. Steyn's report was made available in advance of the Assembly in July 2003, the full text of which is available at <www.iupac.org/news/archives.html>, under Union's Plans/Assessments/Reports.

Photo by Larry Munn/Ottawa

The IUPAC president and vice president with the group of retiring division past presidents, division presidents, and standing committee chairmen (from left): sitting in the front row—Nelson Wright, Wendy Warr, Bob Gilbert, John Ralston, Tom Cvitas; standing in the back row—Leiv Sydnes (vice president), Torbjörn Norin, Parry Norling, Folke Ingman, George Wilson, John Corish, Piet Steyn (president). *(One retiring chairman, Gerhard Schneider, was unavailable the day of the reception.)*

IUPAC also helps advance communication on the latest chemical research by sponsoring a myriad of conferences and symposia on subjects such as bio-informatics, advanced materials, π-electron systems, biophysical complexity, and plasma chemistry. As the article on page 8 attests, the IUPAC Congress and General Assembly (GA) continue to be major events for connecting scientists—especially those who are just starting their careers—throughout the chemistry community. In Ottawa, we awarded nine IUPAC Prizes to the 2002 and 2003 winners. In addition, through the Young Scientists Program, 85 young chemists from 45 countries were invited to participate in the IUPAC Congress. A number of them were also invited to be Observers at the GA, in the hopes that they would become better acquainted with IUPAC and its many functions.

IUPAC is also committed to broadening its national membership base and increasing diversity in IUPAC bodies with regard to geography, gender, and age. Bureau members Prof. Hitoshi Ohtaki and Prof. Bob Gilbert have visited the chemical fraternities of several countries to negotiate IUPAC membership; their efforts complemented the numerous recent visits of the vice president and myself to other locations. At the Council meeting in Ottawa, it was a great pleasure to welcome Bangladesh as a full member and Mauritius as an associate member. More recently, at the Mendeleev Conference held in Kazan, Russia, in-depth discussions were held with the chemistry leadership of the previous republics of the Soviet Union to encourage them to join IUPAC.

The leadership of IUPAC takes enormous pride in the achievements of its members and their service to the discipline of chemistry. Obviously these achievements were reached through the contributions of a host of individuals, working either in teams or individually. In Ottawa, I presented awards to the leadership of IUPAC in recognition and appreciation of service rendered. The first awards were made to John Corish, Tomislav Cvitas, Robert Gilbert, Folke Ingman, Torbjörn Ingman, Parry Norling, John Ralston, Gerhard Schneider, Wendy Warr, George Wilson, and Nelson Wright. In addition, special tributes went to Ted Becker, retiring secretary general after 8 years of service, and to Alan Hayes, retiring past president. We salute you for your distinguished service to the Union.

I am especially indebted to all my colleagues in the Union, and in particular the officers, members of the Bureau, and the executive director and his team at RTP. I stand in awe of the commitment of so many top-quality scientists—the "IUPAC Family"—to projects on behalf of IUPAC, the industrial community, and world chemical research. Your unselfish contributions enhance the image of IUPAC at the international level in scope and impact.

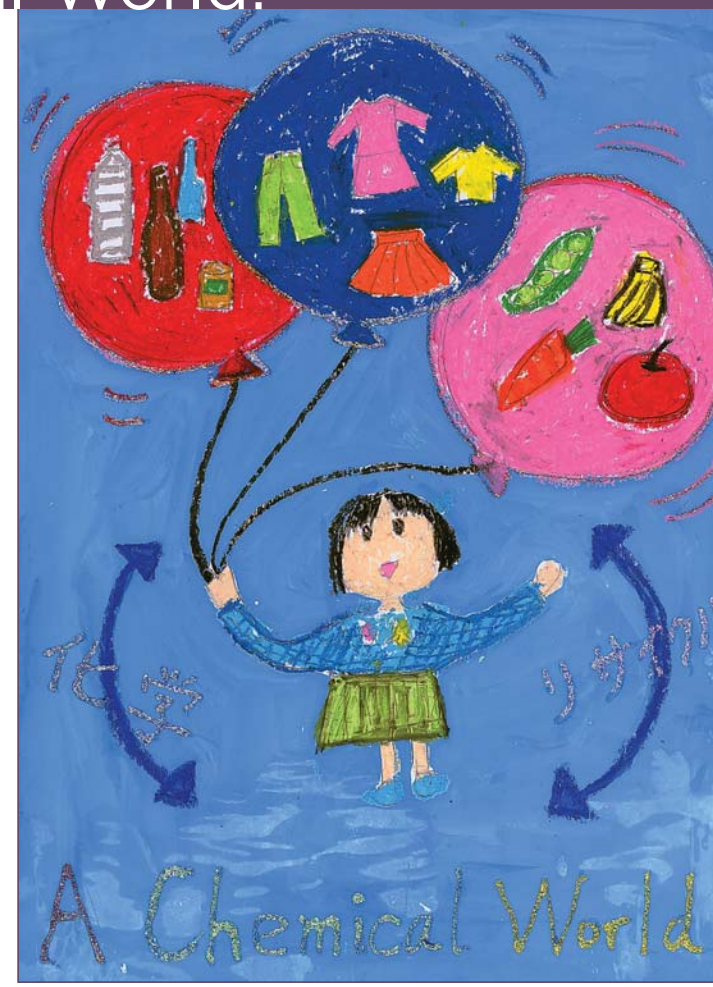
Piet Steyn <psst@sun.ac.za> is the current IUPAC president and has been involved with the Union since 1973. He is director of the Division of Research Development of the University of Stellenbosch in South Africa.

www.iupac.org/news/archives/2003/p_report_steyn.html

"It's A Chemical World!"

The Overwhelming Success of A Poster Competition

by Lida Schoen



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The intriguing images you see on these pages are the 10 winning entries in the "It's A Chemical World" Poster Competition for students ages 10-16, which was organized by Science Across the World (SAW) and IUPAC's Subcommittee on the Public Understanding of Chemistry. During the joint meeting of IUPAC's Congress and the Canadian Society for Chemistry (CSC) in August 2003 in Ottawa, Canada, about 30 posters from the competition were exhibited. Among them were the 10 winners of the contest. The display proved to be very popular among the 2500 delegates from about 60 countries who attended the meeting. It was stunning to see how these students combined their visions of our chemical world with their artistic skills. Peter Mahaffy (IUPAC), Kathy Darvesh (CSC), and Lida Schoen (SAW) were proud to show these pieces of art and imagination.

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The Idea

In August 2002, during the 17th International Conference on Chemical Education in Beijing, China, IUPAC's nascent Committee on Chemistry Education (CCE) and its subcommittee on the Public Understanding of Chemistry held their first meetings. Chaired by Peter Mahaffy, the subcommittee made plans for various projects and activities, including a workshop to be held in Ottawa during the 2003 IUPAC Congress. During these discussions, an ambitious idea was introduced to organize a worldwide poster competition that would enhance public understanding of chemistry. The idea was to ask young people to visualize their ideas about living in a chemical world. It was thought that such an activity would involve students directly, raise awareness internationally, and capture the attention of attendees at the 2003 Congress in Ottawa. Lida Schoen, also a member of CCE, offered the help of the SAW program.

Advertising the Competition

All members of the CCE and the entire SAW team were asked to advertise the competition to students, aged 10–16, in their respective countries. Announcements were published on the Web sites of the two organizations and posters advertising the competition were sent electronically to teachers' magazines. IUPAC and the CSC included notices in their mailings about the joint conference. The results of these efforts were astonishing.

1. ***Rikako Yoshida*** *(Age 10), Japan.*
   My World—A Chemical World

2. ***Joanna Sieczko*** *(Age 13), Poland.*
   From Inside Out

3. ***Can Etik*** *(Age 13), Turkey.*
   Chemistry is Everywhere

4. ***Tania Bancila*** *(Age 13), Romania.*
   Magic Cosmetics

SAW Mailboxes Jammed with Entries

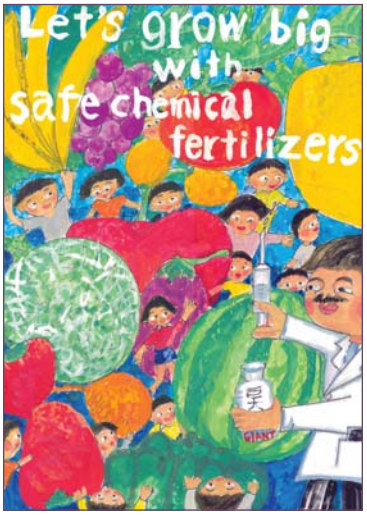
Just before the deadline, the metal mailboxes at SAW headquarters in Hatfield, UK, became completely blocked as 255 real pieces of art arrived. SAW's electronic mailboxes had to be emptied several times per day, because of an overflow of 147 graphic files and PowerPoint presentations. In total, 402 entries were received from 24 countries (see table for breakdown).

The entries were divided into two age categories: 10–13 and 14–16. The judging of the entries on paper was conducted by Marianne Cutler and Karen Shoebottom (SAW), who selected a short list of finalists. These entries were professionally scanned and sent to Canada. Lida Schoen dealt with the electronic entries. She asked 25 experienced teachers from six Eastern European countries who were attending a meeting in Varna, Bulgaria, to help reduce her long list. They could hardly manage: too much creativity, imagination, and ability!

Australia	5	Korea	52
Austria	18	Poland	42
Brazil	6	Portugal	1
Bulgaria	7	Puerto Rico	3
Canada	26	Romania	15
China	4	Siberia	10
Croatia	3	Slovakia	1
Finland	6	Turkey	4
Germany	16	UK	40
Iran	4	Ukraine	114
Israel	7	USA	11
Japan	4	Vietnam	3
		Total	402

Short List and Jury

Both lists were published on the Web site of the King's University College in Edmonton, Canada. A panel of judges, consisting of Margaret-Ann Armour (chair, Chemical Education Division, Chemical Institute of Canada), Ludo Brandt (Leuven University, developer of DIDAC), Madeleine Jacobs (editor in chief, *Chemistry & Engineering News*), Fabienne Meyers (managing editor, *Chemistry International*), and Martin van Os (head of Research and Development, National Centre for School Improvement, Netherlands) chose five prize winners from both age categories.



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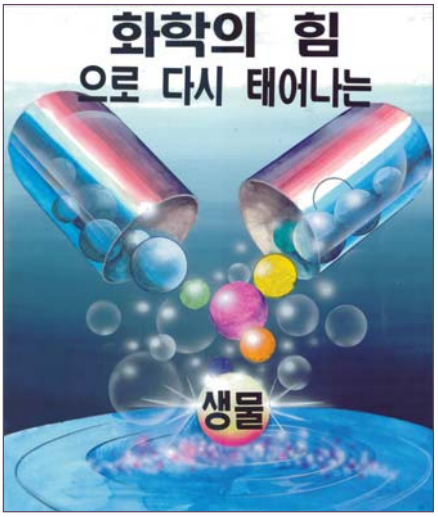

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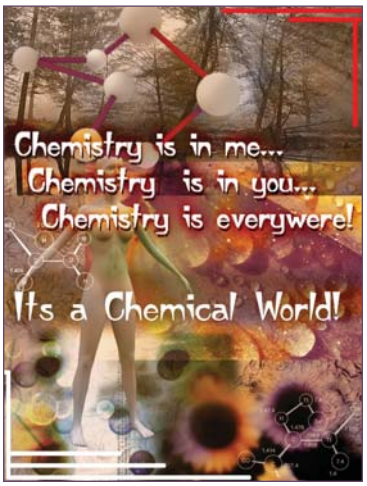

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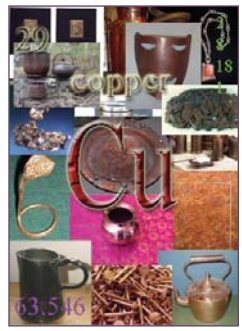

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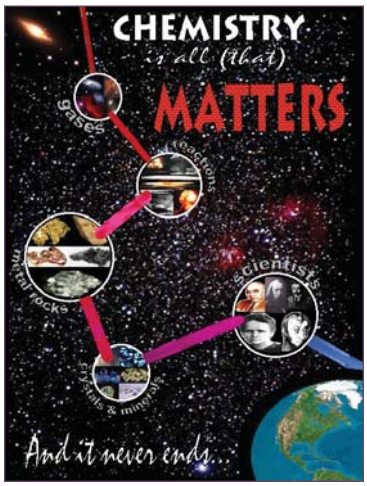

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The Winners

The 10–13 year old winners will receive *The Most Amazing Pop Up Science Book*, the 14–16 year old winners will receive *How Science Works*, and all winners will receive a t-shirt and a certificate of participation signed by Marianne Cutler, director of SAW, and Piet Steyn, president of IUPAC. The teachers with the most top-quality entries won one of the three monetary prizes: Can$ 250, 150, and 100 (donated by the CIC/Chemical Education Trust Fund in Canada). AGFA-Gevaert and the UNESCO Science and Engineering program offered four complete DIDAC sets, which include five books with transparencies illustrating the whole chemistry curriculum, to the winning teachers. Every teacher who entered the contest will receive a CD version of DIDAC, which is to be released this October.

Sharing the Art and Imagination

A Web gallery with about 40 entries has been arranged on the IUPAC Web site. See <www.iupac.org/images/poster>. For those who did not have a chance to view the display in Ottawa, here they are, simply for your enjoyment!

Acknowledgment

IUPAC and SAW acknowledge the support and donations by GlaxoSmithKline, the Chemical Institute of Canada, the Chemical Education Trust Fund in Canada, UNESCO's Science and Engineering programme, and Agfa-Gevaert. All our thanks go to the teachers who encouraged the students to prepare posters, and simply to all the students who took part into the contest.

Lida Shoen <amschoen@xs4all.nl>, based in the Netherlands, is a titular member of the IUPAC Committee on Chemistry Education and the Subcommittee on the Public Understanding of Chemistry, and is a member of the Science Across the World team.

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*5. **Rune Kondo** (Age 11), Japan.*
Let's Grow Big with Safe Chemical Fertilizers

*6. **Byung-Chan Kang** (Age 16), Korea.*
The Power of Chemistry

*7. **Silviu Postavaru** (Age 16), Romania.*
Chemistry is in Me, in You, and Everywhere!

*8. **Cha Seung Jun** (Age 16), Korea. Chemistry is Life*

*9. **Mahdi Adib** (Age 16), Iran. It is Elemental*

*10. **Meni Scherbakovsky & Ori Sternberg** (Age 16), Israel. Chemistry is All that Matters*

IUPAC in Ottawa

Every two years, IUPAC holds a General Assembly (GA) for governance meetings of its Council and Bureau, and for all division and standing committees and other bodies. Since 1997, the GAs have been held in the same city as the biennial scientific Congress. This year the GA and Congress were held from 8–17 August in Ottawa, Canada. This was only the second time that the meetings were held concurrently—the first was in 2001 in Brisbane. An intense and intricate schedule of various committee meetings took place over 10 days with the Congress itself basically scheduled in the middle of that period. The last meeting to take place was that of the Council, the highest governing body of IUPAC, composed of delegates from the member countries.

As IUPAC President Piet Steyn remarks in his column on page 2, both the GA and the Congress are major events for IUPAC. CI *asked IUPAC Executive Director John Jost and the Congress President Alex McAuley to highlight the major developments that took place in Ottawa.*

The General Assembly

by John W. Jost

The 42nd General Assembly brought 340 registered participants to Ottawa, Canada, in August. Although this was the first GA following the restructuring that discontinued most commissions, several task groups, subcommittees, and working parties also arranged meetings during the GA.

Photo by Larry Munn/Ottawa

With an agenda as thick as a phone book, the 25 or so members of the Bureau met for a day and a half during the GA.

With the financial support of IUPAC, 145 GA participants also registered as regular attendees at the Congress. Although the GA schedule is packed with meetings every day, not all members are required to participate in all meetings. The intercalation of the Congress in the schedule of the GA is planned so that GA attendees can, in theory, participate in some of the numerous scientific sessions offered by the Congress. Some delegates (representatives of the National Adhering Organizations [NAOs] and Associate NAOs) who were only convened for the Council meeting 16–17 August arrived earlier and also attended the Congress.

With various sources of financial support, 25 Young Observers participated in meetings of the GA and also attended the Congress. This year, the Young Observers program was expanded to include Australia, Brazil, France, Germany, India, New Zealand, and Puerto Rico so that one Young Observer from each country was able to also attend the GA. From countries that have their own program, nine young observers came from the USA, five from the UK, three from Japan, and one from Canada.

At a Welcome Reception on Saturday 9 August, IUPAC President Pieter Steyn addressed the GA participants and took the opportunity to review some of the major accomplishments of the Union in the current biennium. Highlights of the evening were the introduction of the nine IUPAC Prize Winners and the presentation of service recognition awards to the retiring division past presidents, division presidents, and standing committee chairmen. The IUPAC Prize Winners received their plaques (and checks) at the official Opening Ceremony of the Congress the following day. The President also acknowledged the generous gift of USD 125 000 made by the Samsung Chemical Corporation to the Macromolecular Division. Prof. Jung-il Jin, vice president of the Macromolecular Division accepted a plaque on behalf of Samsung in recognition of this grant (see page 15).

While the week continued with various committee meetings and the Bureau meeting, an amazing event took place on 14 August: a gigantic blackout left the entire province of Ontario, as well as a number of states in the northeastern USA, without electricity. The failure of the electrical grid continued for a few days, but luckily the University of Ottawa, the site of the GA, had sufficient emergency power to allow meetings to continue on Thursday and Friday. By Saturday, power was slowly restored to most of the campus and large parts of the city of Ottawa.

On 15 August, over 50 participants, including the presidents of many chemical societies, attended the World Chemistry Leadership Meeting (WCLM). The WCLM assembles the presidents of national chemical societies, regional chemical federations, and leaders of chemical industry to discuss subjects of importance to the global chemistry community. A report on the WCLM will appear in a future issue of *CI*.

The Council met on 16 and 17 August. One function of the Council is to elect the officers and elected members of the Bureau. The Council elected **Bryan Henry** as vice president. Professor of chemistry at the Department of Chemistry and Biochemistry at the University of Guelph in Ontario, Canada, B. Henry will become IUPAC president in 2005. He served as Scientific Program chair of this year's IUPAC Congress, and since 1998, as chair of the Canadian National Committee for IUPAC. His accomplishments also include serving as chair of the Committee of Chemistry, Department Chairs of Ontario Universities (1990–1993), vice president (1991–1992) and president (1992–1993) of the Canadian Society for Chemistry (CSC), and vice chair (1996–1997) and chair (1997–1998) of the Chemical Institute of Canada (CIC).

This year, the Council also elected **David StC. Black** of Australia as secretary general and reelected **Christoph F. Buxtorf** of Switzerland as treasurer. Leiv K. Sydnes of Norway succeeds to the presidency on 1 January 2004. Werner Klein of Germany, retiring president of the Chemistry and the Environment Division, and Anders Kallner of Sweden, retiring president of the Chemistry and Human Health Division, were elected to the Bureau. Nicole J. Moreau of France and Oleg M. Nefedov of Russia were reelected to the Bureau.

The Council adopted a proposal of the Governance Structure Committee to establish an ad hoc Union Advisory Committee.

The Council adopted a proposal of the Governance Structure Committee (GSC) to establish an ad hoc Union Advisory Committee (UAC). The GSC, chaired by Leiv Sydnes, was established to analyze the strengths and weaknesses of the current structure and operation of the Bureau, including its Executive Committee. The UAC, comprised of one representative from each NAO, will meet only at the GA and will be consulted between meetings by the Executive Committee on policy matters. This new body should greatly improve two-way communications between IUPAC and its NAOs. The UAC will operate primarily by e-mail but is expected to meet at the next GA in Beijing in 2005. Other GSC proposals, such as the idea of replacing the Bureau and Executive Committee with an Executive Board—to consist of the five officers plus four members elected by the Council—were not adopted at the GA and were deferred for further study.

Photo by Larry Munn/Ottawa

The IUPAC Council in session.

Additionally, a Bureau proposal to bill national subscriptions in national currencies was overwhelmingly adopted by the Council. This change will allow NAOs to pay in USD at the then-applicable exchange rate, insulating them from currency fluctuations.

The Council approved the motion for a proposal presented by the UK delegation for IUPAC to set up a task force to tackle the problem of the declining numbers of young people being attracted into chemistry. It was proposed that the task force first define the extent of the problem at the international level and then approach chemical industry to raise funds for enhancing the importance of chemistry education.

Other major decisions by Council included approval of the application of the Italian NAO to hold the 44th General Assembly and 41st Congress in Torino in August 2007. Council approved the application of the Bangladesh Chemical Society to become the forty-fifth IUPAC NAO and approved the Chemical Society of Mauritius at the Associate NAO status.

As announced in the September issue of *CI*, the

Council approved the name and symbol for element of atomic number 110—darmstadtium, Ds.

Highlights of the decisions made by the Council and the Bureau can be found on the IUPAC Web site, in the News section. Minutes of the committee meetings will be posted in due course.

www.iupac.org/news/archives/2003/42nd_council/highlights.html

The IUPAC Congress and Conference of the Canadian Society for Chemistry

by Alex McAuley

The joint meeting of the 39th IUPAC Congress and the 86th Conference of the Canadian Society for Chemistry (CSC) was held in Ottawa from 10–15 August 2003 at the Westin Hotel and Ottawa Congress Centre. In all, 2500 participants attended, including 850 students, with slightly over 2000 papers presented, 800 as oral presentations and 1200 as posters. Although the GA of IUPAC had been held in Montreal in 1962 and the Congress in Vancouver in 1981, this was the first occasion in North America that the national chemical society has joined with IUPAC for the scientific meeting in addition to playing host to the GA and Council meetings.

The title of the conference—"Chemistry at the Interfaces"—was chosen to indicate the breadth of chemical science and to confirm the vitality of our subject not only in the macro-interfaces, from biology through materials science to physics and computing science, but also within the micro-interfaces of the various subdisciplines of chemistry.

The Congress was opened formally by Dr. Arthur Carty, president of the National Research Council of Canada, the National Adhering Organization of IUPAC. As Dr. Carty remarked, "many of the advances in these interfacial-interdisciplinary areas and much of the potential have been driven by three scientific revolutions which are now occurring simultaneously. The first is the information technology revolution sparked by the discovery and development of the all-electronic digital computer. This digital revolution is being rivaled by a second in molecular biology and biotechnology through genomics and proteomics which stands to revolutionize heath care, reengineer agriculture, and help drive a new bio-energy industry. The third revolution, only in its infancy, is in nanomaterials science. These revolutions, particularly biotechnology and nanoscience, have one characteristic which is quite distinctive and appealing. They are not in the domain of a single discipline but are multidisciplinary in nature."

Photo by Larry Munn/Ottawa

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

A special effort was made to attract to the Congress scientists who are at early stages in their careers. Among those presenting results were 85 young chemists from 45 countries, all of whom had been awarded partial support from a variety of sponsors. In addition, a highlight of the opening ceremony was the presentation of nine IUPAC Prizes awarded in 2002 and 2003 to recent Ph.D. graduates on the basis of their dissertations (see photo above of winners).

Each morning the technical program began with a plenary lecture by an internationally recognized scientist. Nobel Laureate Professor John Polanyi described "Reactions at Surfaces, Studied One Molecule at a Time;" Chemical Institute of Canada Medallist Professor Raymond Kapral lectured on "A Hop, Jump, and a Skip: Quantum Reactions in

Classical Solvents;" and Professor Jean Fréchet introduced "Organic Chemistry and Molecular Design at the Interface of Biology, Engineering and Physics." Unfortunately, Nobel Laureate Professor Richard Smalley was indisposed, but his place was ably taken by Dr. Michael Gait who provided a historical context in his lecture "50 Years of Nucleic Acids Synthesis: A Central Role in the Partnership of Chemistry and Biology." More than a dozen CIC and CSC award lectures were presented.

The main body of the technical program, which consisted of over 50 symposia in more than 160 sessions, was both international in scope and broad in range of topics. The program included six specific chemical themes: Analytical/Environmental, Chemical Education, Inorganic, Macromolecular Science and Engineering, Organic, and Physical and Theoretical. There was also a special symposium devoted to synchrotron radiation and the opening of the Canadian Light Source in early 2004. Two symposia celebrated the careers of two distinguished Canadian chemists: Dr. Arthur Carty (Inorganic) and Dr. Almeria Natansohn (Macromolecular). Four symposia focused on supramolecular chemistry. The Chemical Education program was the largest in recent memory. Within the broad symposia topics there were areas as diverse as: Nanoparticles and Carbon Nanotubes, Environmental Quality and Human Health, Metalloproteins and Metals in Medicine, Activation of Small Molecules by Early Transition Metals, Polymers in Electronics and Photonics, the Chemistry of Nucleic Acids, Organic Synthesis, and Chemical Biology.

Opened to the public at large, a special symposium on the Public Understanding of Chemistry, was coordinated by the IUPAC subcommittee of the same name. Questions such as "How do ideas flow between chemistry and the public through the media?"; "How do they flow between the research lab and industry or public use?"; and "How do ideas flow through society?, were the central themes of the debates."

The main body of the technical program, which consisted of over 50 symposia in more than 160 sessions, was both international in scope and broad in range of topics.

The arrangements for the conference went smoothly until the power failure occurred late Thursday afternoon. Unfortunately, this caused the cancellation of 45 lecture presentations on Friday morning, including the plenary lecture by Professor Howard Alper on "A Chemist's Journey into Policies and Politics." However, attempts are being made to offer authors the opportunity of depositing their papers on the conference Web site. In addition to the oral and poster presentations, a fine exhibition of equipment, books, and other materials was well attended.

Technical aspects of the Congress program were supported by many Canadian and international organizations, including, as major sponsors, the National Research Council of Canada, Wiley Publishers, Imperial Oil, and Xerox. In addition, funds were provided principally by the U.S. Army Research Office, UNESCO Paris and Canada, the Canadian National Committee for IUPAC, and the Natural Sciences and Engineering Research Council of Canada to assist young scientists from many countries to attend the meeting and present their results as posters or oral presentations.

Photo by Larry Munn/Ottawa

Alex McCauley, Congress president, delivers remarks at the Opening Ceremony. Seated (from left) are Arthur J. Carty, president of the National Research Council of Canada; John Vederas, president of the Canadian Society for Chemistry; and Piet Steyn, IUPAC president.

Safety Training Program

Safety Training Fellows Visit Japan, South Africa, and USA in 2002 and 2003

by Mark C. Cesa

The IUPAC Committee on Chemistry and Industry (COCI) has a strong focus on safety in chemical operations. Through its Safety Workshops (see *CI* Vol. 25, Jul-Aug 2003, p. 32) and the IUPAC-UNESCO-UNIDO Safety Training Program, COCI disseminates state-of-the-art practices in health, safety, and environmental quality worldwide.

The Safety Training Program allows safety experts from developing countries to learn about safety and environmental protecton measures by visiting and working in the plants of IUPAC Company Associates in the industrialized world. IUPAC, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the United Nations International Development Organization (UNIDO), established the program in 1993 to promote interactions between developed countries and the developing world to disseminate state-of-the-art knowledge on safety and environmental protection in chemical production.

The Safety Training Program covers the following topics:

- process safety management
- environmental protection
- HAZOP/HAZAN analysis
- legislative measures and interaction among industry, universities, government, and the public
- emergency planning and model studies
- "responsible care" and its relevance to developing countries
- integrated approach for safety, health, environment (SHE) at unit and company levels, and training of university teaching staff in SHE
- ISO 9000 and 14000 series
- material safety data sheets (MSDS)

Since COCI reactivated the program in 1999, this important initiative has grown considerably. Five international Fellows have received training at IUPAC Company Associates in the USA, Japan, and South Africa. The training of two Fellows in 2000 was the subject of a recent article in *CI* (Vol. 23, Mar-Apr 2001, p. 33).

In 2002, COCI sponsored three Fellows for hands-on training in health, safety and environmental practices at IUPAC Company Associates Sankyo Co., Ltd. in Japan, Sasol in South Africa, and BP Chemicals, Inc. in the USA:

- **Kelvin Khisa**, deputy director of the UNIDO/UNEP/UNDP sponsored Kenya National Cleaner Production Centre in Nairobi
- **Tersoo Charles Gwaza**, HSE trainer at Shell Petrochemical Development Company in Nigeria
- **Zhang GuoHong**, senior engineer, Security and Environment Protection Bureau of Sinopec in Beijing

Kelvin Khisa's training was hosted by Dr. Shinroku Iwamatsu, vice director, Manufacturing Division of Sankyo Co., Ltd. During Khisa's very busy two weeks, he visited Sankyo research laboratories and production facilities at Tanash, Odawara, Onahama, and Hiratsuka, Japan. In addition, he visited facilities of the Shimizu Corporation, Tokyo Eco, Fuji Film, the Central Bank Water Outside Landfill Site, and the New Sea Area Land Reclamation Site in Tokyo, the Japanese National Institute of Industrial Safety, Tokyo metropolitan government offices, and the Chemical Society of Japan. Khisa plans to hold workshops for industrialists in several Kenyan cities, to train safety auditors and carry out safety audits, to set up occupational health and safety demonstration projects for industry and universities, and to work with relevant government ministries to propose and implement realistic occupational health and safety policies.

Kelvin Khisa (left) examines environmental monitoring equipment with a representative of the Japanese National Institute of Industrial Safety.

Tersoo Charles Gwaza's visit to Sasol Research and Development in Sasolburg, Secunda, and Johannesburg, South Africa, in June 2002 involved learning about the company's occupational hygiene, process safety management, hazard identification risk assessment, and accident investigation techniques.

He stated, "(This) training is a worthwhile investment and has sensitized me to a greater commitment to safety and environmental issues, an exposure that has left (the) impression . . . that it is possible to have an indigenous company in the developing world operate with . . . best practices." Gwaza has shared his learinings with Shell Nigeria staff and contractors, and plans to join the Shell Nigeria accident investigation team. He also will work with the state government of Benue, Nigeria, on safety and environmental issues.

Tersoo Charles Gwaza visited Sasol's health, safety, and environmental facilities in South Africa during June 2002.

Zhang GuoHong visited BP Chemical's corporate headquarters in Naperville, Illinois, and a chemicals production site and refinery in Lima, Ohio, in September 2002. His hosts, Geoffrey Gilman and Michael Markowicz, both health, safety, and environmental professionals at BP, provided intensive instruction in company-wide safety issues, laboratory SHE practices, and compliance with governmental regulations. Mr. Kevin Sprague provided guidance on SHE activities at a chemical production site. Since his return to China, Zhang has written prolifically in Chinese chemical safety magazines about what he learned at BP.

Zhang GuoHong of Sinopec inspects an experimental setup in a BP Chemicals laboratory during a safety audit.

Five potential Fellows have received invitations for training during 2003, and applications are now invited for placement in the Safety Training Program for 2004. Each scientist or engineer accepted into the program is assigned to an IUPAC Company Associate in an industrialized country. The period of training is typically one to three weeks. Accommodation, meals, and travel expenses are provided for all trainees.

Candidates successfully completing the program submit a detailed report to the director of the program and the host company. Trainees receive a certificate confirming their participation in the program. Successful candidates will be professional scientists and engineers who are currently:

- involved at a supervisory or managerial level in chemical companies, government institutions, or scientific institutions
- engaged in aspects of safety and environmental protection in chemical, pharmaceutical, or biotechnological production or in the teaching of these fields
- able to influence safety practices in their places of employment and elsewhere within their home country

Application forms and further information on the Safety Training Program can be obtained at <www.iupac.org/projects/1993/022_11_93.html> or from the COCI secretary:

Dr. Mark C. Cesa
Secretary, COCI
IUPAC, c/o BP Amoco Chemicals, Inc.
150 W. Warrenville Rd., MS F-7
Naperville, IL 60563

Mark C. Cesa <cesamc@bp.com> is secretary of the IUPAC Committee on Chemistry and Industry (COCI), director of the IUPAC-UNESCO-UNIDO Safety Training Program, and senior research associate at BP Amoco Chemicals, in Naperville, IL, USA.

www.iupac.org/standing/coci/safety-program.html

A Central Position for Hydrogen in the Periodic Table

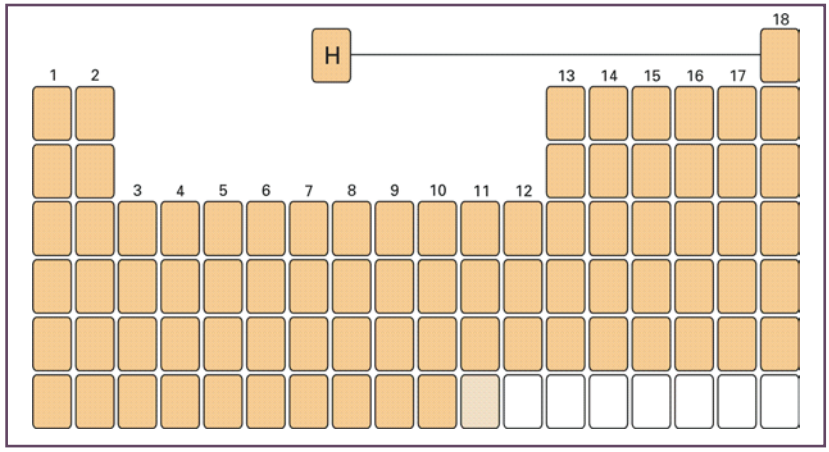
by Herb Kaesz and Peter Atkins

Many years ago in the now classic textbook *College Chemistry* (W.H. Freeman & Co., 1954), Linus Pauling placed the symbols for hydrogen and helium at the head and center of the periodic table with arrows indicating the chemical relationships of hydrogen to two families of elements, the alkali metals and the halogens. The symbol for helium was connected by an arrow to the noble gas family. We believe an adaptation in which hydrogen is centered at the head of the periodic table has great merit (see figure) and raise this proposal for consideration and adoption by IUPAC.

The position of hydrogen in the traditional form of the periodic table is at the head of Group 1 (the alkali metals) based on the similarity of the valence shells of this family: each of the elements possesses a half-filled s-orbital, namely, H 1*s*1, Li 2*s*1, Na 3*s*1, etc. However, the properties of hydrogen differ significantly from those of the other elements in Group 1. Hydrogen is a gas, not a reactive metal. The hydrogen ion, H^+, plays an extraordinary and characteristic role in acid-base chemistry by virtue of its size and mass. Non-metals with electronegativity comparable to that of hydrogen form covalent bonds with that element resulting in volatile molecular substances. In contrast, compounds of the alkali metals and the non-metallic elements are ionic. Furthermore, hydrogen will accept electrons from the electropositive elements of Groups 1 and 2 to form salt-like hydrides comparable to the salts formed by the reaction of the halogens with these electropositive elements. Thus, some authors place the symbol for hydrogen at the head of Group 1 and also at the head of Group 17.

We believe an adaptation in which hydrogen is centered at the head of the periodic table has great merit . . .

We do not support the duplication of hydrogen in the periodic table. Instead, we believe the symbol should appear only once in the table, in Period 1 but centered between the alkali metals and the halogens as illustrated in the figure. This position is consistent with the elements at the head of each group being significantly different from their congeners: hydrogen lies at the head of the entire table and as such can be expected to be strikingly different from all the elements, as is in fact the case.



The proposed format of the periodic table, with hydrogen at its head in Period 1 but assigned to no group.

Herb Kaesz, professor at the University of California at Los Angeles, CA, USA, is a member of, among others, the IUPAC Inorganic Chemistry Division and the Committee on Chemistry Education. Peter Atkins, professor at Lincoln College at the University of Oxford, UK, is the chairman of the IUPAC Committee on Chemistry Education.

Send your comments by e-mail to <edit.ci@iupac.org>.

Samsung Gives Gift to the IUPAC Macromolecular Division

On 9 August 2003, at the Members Reception of the IUPAC General Assembly, IUPAC President Pieter Steyn acknowledged the generous gift of USD 125 000 made by Samsung General Chemicals to the IUPAC Macromolecular Division. Samsung made the contribution in order to support IUPAC's effort to discover and cultivate world-class researchers. In particular, they hope that their financial contribution to IUPAC will assist young researchers and students in polymer science.

Samsung General Chemicals is an affiliate of Samsung Group, the largest industrial operation in South Korea. The petrochemical complex at Daesan, Korea, annually produces over 2 million tons of basic petrochemicals, olefins, and polyolefins. These products are sold in more than 90 countries all over the world. Samsung General Chemicals has developed and commercialized sophisticated new materials that have major impacts on industry and society.

Steyn presented a plaque to Samsung in appreciation of their gift. At the reception, the plaque was accepted by Prof. Jung-Il Jin, vice president of the Macromolecular Division.

Samsung Chemicals Chief Executive Officer Ko Hong-Sik commented that the company's management philosophy stresses application of human resources and technology to create top-quality products and services that can contribute to the well-being of humankind. "We aim," Hong-Sik said, "to shape a better future for the world taking on all the challenges in front of us in cooperation with our clients." In his opinion, chemistry supports all the other branches of science and is applied to a broad range of technologies as well as academic research. He also stressed that academia and industry should work together to advance human welfare, and that the development of new environmental, bio, and nano technologies are instrumental in nurturing a safe and protected environment, treasuring natural resources, and improving living conditions.

Pirketta Scharlin Received the 2003 Franzosini Award

At the 2nd Annual Meeting of the Subcommittee on Solubility and Equilibrium Data, the Franzosini Award went to Dr. Pirketta Scharlin in appreciation of her continuous scientific and administrative contributions to the Solubility Data Project. It should be emphasized that Dr. Scharlin became the first scientist to receive the Franzosini Award twice.

Scharlin's expertise in the solubility of gases in liquids has led to one of the most successful sold-out volumes in the Solubility Data Series: Vol. 62, titled *Carbon Dioxide in Water and Aqueous Electrolyte Solutions*, published in 1995. At present she is chairing the Task Group of the project titled "Carbon dioxide in aqueous non-electrolyte solutions," an undertaking of the section on Solubility Data Related to Industrial Processes.

Dr. Scharlin served from 2000–2001 as chair of the Subcommittee on Solubility of Gases in Liquids. Since 2002 she has been a member of the Subcommittee on Solubility and Equilibrium Data, where she of course acts as the speaker for the task groups working on projects dealing with the solubility of gases in liquids. In addition to her scientific and administrative activities she is also successfully recruiting younger scientists interested in solubility data projects, such as Justin Salminen (Helsinki University of Technology), winner of the 2001 Franzosini Award.

Dr. Scharlin is docent and teaching assistant with the Department of Chemistry, University of Turku (Finland). Her research interests include not only solubilities of gases in liquids, but also excess thermodynamic properties of binary and ternary liquid mixtures.

Letters from Readers

Although the following letter is a fiction story, it is unusual enough to be of interest. The original tale, in French, is posted on the Web site of the French Chemical Society. Follow-up stories drafted by students of the University of Cergy Pontoise are also available on the site: <www.sfc.fr>, follow "Les dossiers de la SFC."

What if All Chemists Went on Strike? (science fiction)

by Armand Lattes

The decision had been made! At the general assembly of their international conference, the chemists of the world decided to cease forthwith all work, analyses, and activities. This decision was made in the face of the incessant, nearly century-long criticisms that consumers, public authorities, and interest groups had hurled at them via the media. The chemists, concerned as they were with the public good and preoccupied with protecting individuals, could no longer stand their outcast status. Accused by much of society of being responsible for all evils, these chemists were actually striving to detect and correct them.

It was thus with sadness, but determination, that they parted company to return to their countries of origin and devote their lives to other activities. At first the decision was unanimousy welcomed with exclamations of relief. Ecology groups were happy to see the back of their favorite target, while consumer associations applauded the retum to a natural environment, which they considered spoilt by chemical activities. Strong personalities—both from the right and left of the political spectrum—took credit for the situation.

For a while the public hardly noticed any change. Curiously, the effect on atmospheric pollution was practically nil: refineries had sufficient reserves of fuel, and vehicles continued to run. Many noticed a fact that chemists already knew: the main culprit in air pollution was the motor vehicle. The chemical industry accounts for only a tiny fraction of global pollution.

The first signs of change appeared when stocks of fuel began to run out. With no chemists to supervise refining processes or analysts to oversee the quality of the finished products it was necessary to halt the flow of oil. Thus , the government took some unpopular decisions: first a rationing system was introduced, then stocks were requisitioned for priority sectors such as health, ambulances, the military, etc.

The first winter presented no problems given the precautions taken by people who had kept their tanks filled with fuel. But they very quickly realized that they could not renew their supplies. Luckily, many had already chosen the all-electric method, and nuclear power stations continued to operate (without supervision by chemists). This at first appeared to limit the consequences of having no fuel.

Nevertheless, there was perceptible dissatisfaction—but not in the environmental protection groups who were recording an appreciable decrease in air pollution with the aid of automatic detection devices. Soon, however, there was a scarcity of the reagents necessary for monitoring air pollution, and all forms of detection from then on became impossible to set up.

At the end of this phase, the use of alternative methods became widespread. People began using bicycles and abdandoned their cars as gasoline stocks were exhausted. With the absence of motor vehicles, bicycle lanes could be used without fear of being run over.

But the intensive use of bicycles had an unexpected consequence: excessive tire wear. The bad state of the public highways, which were losing layers of tarmac, meant that tires wore down rapidly. People soon learned that road pavement and tires are the result of chemical synthesis. When tires could not be replaced, bicycles were in turn abandoned.

With the start of the second winter, the heating situation became very serious. The second eruption of the PINATUBO volcano in the Philippines had polluted the atmosphere to a height of 24 kilometers, destroyed 20% of the ozone layer, and caused a violent fall in global temperatures. People, in the absence of most of their normal energy sources, began using old-fashioned sources such as coal and wood.

But with no chemists to supervise the cokeworks, sulphurous, and even acidic gas were produced in massive amounts. This caused an increase in asthma cases and the destruction of forests by acid rain. In addition, there were numerous cases of carbon monoxide poisoning due to clumsily modified boilers.

Wood was still plentiful, especially with the closure of pulp-producing paper mills. France, a country with extensive forests, drew on its reserves. However, these soon ran down given because of acid rain and parasites that had become virulent without pesticides.

Troubles never come singly: an incident in a nuclear power station, linked to the lack of chemical controls in the development of the core or of its environment, obliged the authorities to take emergency measures

that led to the closure of all the power stations. With electricity only in limited supply and with travel limited to short distances, human beings reverted to their tribal instincts: the haves became jealous of what they possessed and were reluctant to share. As a result, "tribal" conflicts became commonplace and bellicose local regimes formed.

The chemists' decision also affected the availability of food. It became impossible to prepare even simple dishes requiring everyday ingredients. Sugar for example, the most common and cheapest, of all chemical products became scarce with out the means to extract and purify it from beetroot. Besides, without fertilizers there was a massive drop in all forms of plant production. Wheat yields were at levels of the nineteenth century, while vegetables, attacked by insects, became more and more rare. The amount of cattle and of farmyard animals was reduced through lack of fodder and medicines to treat diseases.

Milk had to be rationed since the means to stabilize it were no longer available. Meat had to be consumed very quickly as there were no conserving agents, nor cardboard or plastic packaging.

Life expectancy fell rapidly, as humans were limited in their movements, gripped by the cold, and restricted to lighting by tallow candlelight (itself an invention of a chemist). Very quickly certain illnesses came to the fore through lack of medicines—the majority of which are produced by chemical synthesis. Thus people learned the following:

- The only medicines available against AIDS came from chemical preparations.
- Certain hormones, such as birth control pills, were entirely manufactured by chemists.
- Aspirin was a chemical product!

In the area of clothing, artificial fibers had disappeared and with it the variety of materials that protected from cold, heat, and bad weather. Natural fibers became dominant: wool (but sheep numbers were falling), then cotton, but without pesticides, whole fields of it were destroyed.

The situation became intolerable. The population no longer had any means of expressing itself. There was no more paper or printing ink and radio and TV no longer broadcast because wire, aerials, and electronic components could not be replaced.

In response, forums were organized at which everyone could express their views. A unanimous agreement was reached: a delegation would be dispatched to persuade the politicians that this state of affairs must cease and that the chemists had to return to work. Coming from deepest France by differing means, by horse and cart and on foot, a delegation was received at the Elysée Palace.

A committee, headed by the vice president of the Senate and the scientific advisor to the President of the Republic (both former chemists), was charged with persuading the chemists to resume work. But first, they had to be located:

- Pierre Potier had opened an herbalist's shop
- Jean-Marie Lehn was organist at Strasbourg Cathedral
- Robert Carrie was trainer of the Rennes football team
- Armand Lattes, former choirboy, had joined the Capitole Theâtre in Toulouse
- Andrée Marquet had opened her own restaurant
- Robert Corriu was a wine expert
- Pham Tan Luu and Emile Vincent had taken holy orders

Thus the French people, stupefied, discovered that behind chemistry there were chemists. These were men and women, just like them, who were as respectful of nature and the environment.

At the start of the negotiations there were hesitations on the part of the chemists who remembered past reprimands. After due thought they were willing to sign an agreement on condition that the community accepted a certain number of ruies which were assembled in a charter:

1) The signataries, having recognized the positive achievements of chemists, will no longer hold chemists or their specialities, responsible for all evils.
2) Each time it is necessary, chemists will be recognized for their achievements instead of having them attributed to other disciplines.
3) Instead of highlighting the negative side of a chemical discovery, an objective analysis shall be conducted on its contribution to society before any statement is made or stand taken.

In exchange, chemists undertake to go back to work and continue their efforts to establish a durable civilization, respectfui of mankind and its environment and guaranteeing the positive effects of progress for future generations.

Armand Lattes <lattes@chimie.ups-tlse.fr> is professor at Paul Sabatier University in Toulouse, France.

The Project Place

Information about new, current, and complete IUPAC projects and related initiatives.
See also www.iupac.org/projects

Chemistry's Contributions to Humanity—A Feasibility Study

The objective of this new project, titled "Chemistry's Contributions to Humanity—A Feasibility Study," is to evaluate the feasibility of developing a Web site that chronicles historical innovations in chemistry that have contributed to the improvement of human life. This site could serve as a source of information and education that would enhance interest in and public appreciation of the enormous contributions that chemistry has made over the past 150 years to the betterment of mankind.

Much work has been done in the past and continues today to educate the public about chemistry and its value to society and to bring balanced understanding about the benefits and risks of chemicals. Consistent with its goals, a possible role for IUPAC is to collate and integrate this array of information so that it is a more valuable resource for students, teachers, policy-makers, members of the chemical enterprise, columnists, and the general public. IUPAC can be at the helm of an international effort which will produce an authoritative source of information on the ways in which chemistry and the industries based on the chemical sciences contribute to a better life.

A Web site that portrays major innovations in chemical science over the past century and a half in an interesting and informative format could help in this task. The site would contain an encyclopedia of major chemical accomplishments that have contributed to the betterment of the human condition. It could include a detailed information base of chemical innovations and developments and permit viewing this information through a variety of queries. In short, the Web site would provide a flexible, "living" macro- and micropedia that could grow and develop in sophistication as needs developed and changed.

This is a very ambitious project—one that will take years to complete and require substantial resources. The immediate focus of the current proposal is a comprehensive analysis of the feasibility and potential value of the overall project.

The task group is particularly interested in any published or public Web site information (in English) on the theme of the "value of chemistry to society." Such information will be useful both to include in a bibliography of what is available today and to assess whether IUPAC can add value in providing a comprehensive Web site on this subject. Any person who has information to contribute to the project is urged to contact the task group chairman or any task group members (see project web page below for details).

For more information, contact the Task Group Chairman Ed Przybylowicz <eprzy@rochester.rr.com>.

www.iupac.org/projects/2003/2003-022-1-020.html

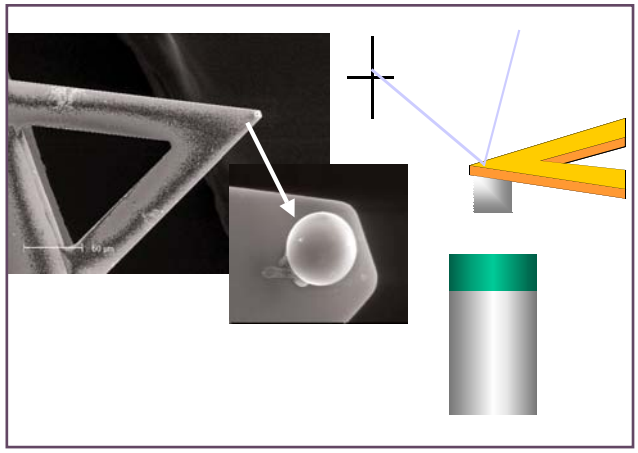
The Use of AFM in Direct Surface Force Measurements

The atomic force microscope (AFM), more correctly described as a scanning probe microscope, can trace its origins to the scanning tunneling miscroscope originally invented by Binning and Roehrer. The AFM is aimed at providing high-resolution topographical analysis for both conducting and non-conducting surfaces. The basic imaging principle is rather simple. In a common configuration, a sample attached to a piezoelectric positioner is rastered beneath a sharp tip attached to a sensitive cantilever spring. The alternative arrangement of a moving tip and a fixed sample is also possible. Undulations in the surface of the sample lead to a deflection of the spring, which is monitored optically. The images obtained are critically dependent on the pressure, or force acting or applied, between the tip and the sample. Furthermore, optimal imaging conditions are inevitably sample dependent.

Whilst the AFM is important for imaging investigations, quantifying the tip-sample interaction has become increasingly important in order to improve the quality and reliability of images obtained. However, it was realized in 1991 that the AFM could be used to measure interaction forces directly between a small sphere, attached to the cantilever, and a flat substrate, resting on the piezoelectric positioner, forming an interesting and highly flexible adjunct to the conventional surface forces apparatus (SFA). Force-distance profiles can now be readily obtained for a variety of soft and hard interfaces and the "colloid probe" technique, as it has become widely known, has also been extended to the measurement of friction forces.

The technique is widely used in a large number of research laboratories, in industry, universities, and research institutions. The purpose of this IUPAC project is to produce a timely technical report that recommends experimental procedures for performing

colloid probe surface force measurements, in normal and lateral (frictional) modes. This project commenced in 2001 and is now in its final stages, with a second draft report prepared. The project team consists of John Ralston (University of South Australia, Adelaide, Australia), Ian Larson (Victoria College, Australia), Mark Rutland and Adam Feiler (Institute for Surface Chemistry, Stockholm, Sweden), Per Claesson (Royal Institute of Technology, Stockholm, Sweden), and Mieke Kleijn (Wageningen, Netherlands).



AFM—how to best obtain reliable images?

The second draft report, now in circulation, deals, with the following:

- AFM development
- calibration of cantilever spring constant for normal (z) deflection
- calibration of piezoscanner
- colloid probe attachment
- force measurements
- construction of force versus distance curves
- different materials
- latest developments

A section on frictional forces is presently being expanded.

The penultimate report will be completed by late December of this year at which time a project meeting will be held in Adelaide to agree on the final version.

For more information, contact the Task Group Chairman John Ralston <john.ralston@unisa.edu.au>.

www.iupac.org/projects/1999/1999-016-3-100.html

Ionic Strength Corrections for Stability Constants

Version 1.5 of the Specific Interaction Theory (SIT) program was released this past September. The program uses specific interaction theory to render ionic strength corrections for stability constants, and includes activity coefficient calculation molar-molal interconversion. The SIT program can be readily applied to industrial processes for which stability constants may be required at very high ionic strengths.

The calculations of stability constants over a wide range of ionic strengths are not trivial, and require for instance a database of ionic coefficients for each ion-ion interaction. The program, developed by L. D. Pettit of Academic Software and part of this IUPAC project, performs the following:

1. calculates activity coefficients (0–5 m)
2. corrects stability constants for the general reaction: $xM + yL + zH_2O$
3. calculates SIT(complex) values from sets of log K/ionic strength values
4. interconverts molarities - molalities
5. interconverts log K(molar) - log K(molal)

The user can select any of 14 background electrolytes and the program uses a text file which currently holds over 360 SIT parameters. The program has an extensive Help file that gives references and equations used. A Russian version, written by Dr. I Sukhno and Dr. V. Buzko, is now available.

Interested persons are invited to download this free program (see Web address below), test it, and send comments.

A comparable program to perform calculations using Pitzer parameters is being prepared. This will perform similar calculations to the SIT program and will also include activity and stability constants changes as a function of salinity, and oxygen, nitrogen, and carbon dioxide solubility as a function of salinity and fluid composition.

For more information, questions, and comments, contact the Task Group Chairman L. D. Pettit <pettit@acadsoft.co.uk>.

www.iupac.org/projects/2000/2000-003-1-500.html

Making an imPACt

Recent IUPAC technical reports and recommendations that affect the many fields of pure and applied chemistry. See also www.iupac.org/publications/pac

Critically Evaluated Propagation Rate Coefficients in Free-Radical Polymerizations: Part III. Methacrylates with Cyclic Ester Groups (IUPAC Technical Report)

S. Beuermann

Pure and Applied Chemistry
Vol. 75, No. 8, pp. 1091–1096 (2003)

Modeling and optimization of free-radical polymerization processes requires the knowledge of accurate individual rate coefficients for the reactions occurring during a polymerization. Pulsed laser-initiated polymerization in conjunction with polymer analysis by size-exclusion chromatography has proven to be a valuable technique to derive propagation rate coefficients k_p. The IUPAC Working Party on Modeling of Polymerization Kinetics and Processes has reported critically evaluated rate coefficient data for styrene and alkyl methacrylates. This paper continues the series by reporting propagation rate coefficients, k_p, as a function of temperature, for bulk free-radical homopolymerizations of oxiranylmethyl, cyclohexyl, and benzyl methacrylate at ambient pressure and low conversion. For each monomer, the rate coefficients have been independently measured in two laboratories. The data determined from experiments carried out in independent laboratories obey the consistency criteria established for this technique. The rate coefficients for the three monomers are well represented by a single Arrhenius relation.

www.iupac.org/publications/pac/2003/7508/7508x1091.html

Minimum Requirements for Reporting Analytical Data for Environmental Samples (IUPAC Technical Report)

H. Egli, M. Assenakis, H. Garelick, R. Van Grieken, W. Peijnenburg, L. Klasinc, W. Kördel, N. Priest, and T. Tavares

Pure and Applied Chemistry
Vol. 75, No. 8, pp. 1097–1106 (2003)

Environmental analytical data are generated to investigate how human activities influence the environment to develop, calibrate and validate environmental models, to test whether either standards or quality criteria are exceeded, and to deduce whether there is a potential or actual risk to ecosystems. In addition to the many purposes they serve, published environmental data often attract extra attention from the general press and public, and may even be used to support advisory or regulatory measures. It is, therefore, in the interest of all involved parties to endeavour to publish only data with a proven quality, known uncertainty, and with sufficient additional information about the sample history.

Under the umbrella of the IUPAC Chemistry and the Environment Division, a project team of scientists from different fields of interests have published this paper to provide recommendations for the minimum requirements for reporting environmental-analytical data. Irrespective of the analyte(s) and the goal of the study, the recommendations give general guidance regarding the minimum information that should be provided to adequately describe the sampling strategy, the method of sampling, the sample properties, all handling between sampling and analysis (including storage conditions, pre-treatments, homogenization, sub-sampling), and the analytical methodology (including calculation and validation procedures). The paper provides specific guidance on the environmental compartments: soil, pore water, ground water, inland surface water, sediment, seawater, precipitation water, and air.

Environmental analytical chemists are the intended audience for this guidance paper. If they follow the recommendations, the utility of the published data for the scientific community would be much improved. Full and adequate use of data is only possible if sufficient information is provided. Editors of journals and reviewers of papers submitted for publication are also encouraged to take into consideration the guidance paper. They are key players in the entire publication process and, in taking seriously their responsibility for a high scientific standard of published articles, should consider refusing papers containing environmental-analytical results if the minimum requirements are not met.

www.iupac.org/publications/pac/2003/7508/7508x1097.html

Atomic Weights of the Elements 2001 (IUPAC Technical Report)

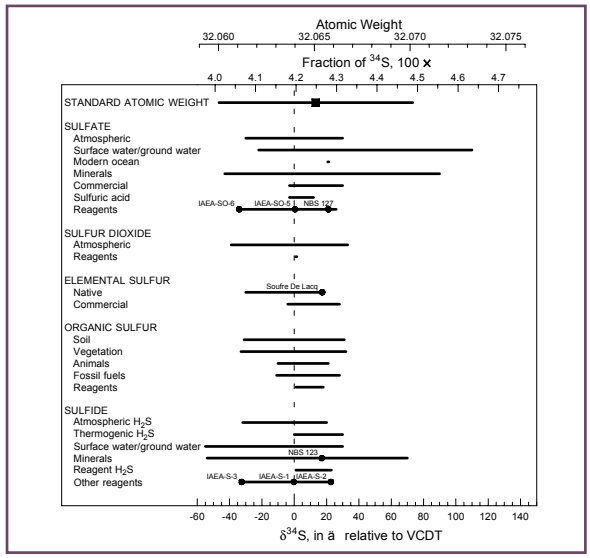
R. D. Loss

Pure and Applied Chemistry
Vol. 75, No. 8, pp. 1107–1122 (2003)

The Commission on Atomic Weights and Isotopic

Abundances wishes to emphasize the need for new precise calibrated isotope composition measurements in order to improve the atomic weights of a number of elements, which are still not known to a satisfactory level of accuracy. However, for many elements the limited accuracy of measurements is overshadowed by terrestrial variability, which is included in the tabulated uncertainty of the atomic weights.

The range of terrestrial variation observed in the atomic weights for most elements is generally small and does not affect most chemists in their day-to-day work. However, as improvements in instrumentation and analyst skill continue to produce more accurate and precise results, analysts may need to seriously consider atomic weight variations, and in some cases actually measure the atomic weights of specific elements in the material they are analyzing. Variations in the atomic weights of elements down to the microscale level also have major benefits, such as the ability to characterize materials not only on their chemical composition but also by their isotopic or atomic weight variability. This variation has been used successfully for many years in fields such as isotope geochemistry and nuclear astrophysics, and is now opening up whole new fields of study in medicine, forensics, and human nutrition. The Commission's task of evaluating atomic weight data has thus expanded into reviewing isotopic abundance literature in increasingly diverse fields. The Commission is therefore seeking the assistance of all isotopic analysts in reporting isotopic data in a specific and comprehensive manner. This issue is being addressed in a current project [# 2001-019-2-200] on "Guidelines for mass spectrometric isotope ratio measurement."



The variation in the atomic weight of sulfur due to natural variation in its isotopic composition (shown here for the fraction of the ^{34}S isotope). The natural variation in the atomic weight of S places a significant limit on the final uncertainty with which the atomic weight for this element may be stated. [fig reproduced from T.B. Coplen et al., Pure Appl. Chem. *74(10), 1987–2017, 2002]*

www.iupac.org/publications/pac/2003/7508/7508x1107.html

Regulatory Limits for Pesticide Residues in Water

D. J. Hamilton, Á. Ambrus, R. M. Dieterle, A. S. Felsot, C. A. Harris, P. T. Holland , A. Katayama, N. Kurihara, J. Linders, J. Unsworth, S.-S. Wong

Pure and Applied Chemistry

Vol. 75, No. 8, pp. 1123–1155 (2003)

This paper, produced by the IUPAC Commission on Agrochemicals and the Environment, provides guidelines for setting limits on pesticide residues in water. National governments introduced residue limits and guideline levels for pesticide residues in water when policies were implemented to minimize the contamination of ground water and surface water. Initially, governments mainly focused on drinking water.

Contamination of ground water by pesticide residues was for many years generally regarded as unlikely because the soil profile acts as a purifying filter. Residue contamination of surface waters was regarded as transitory because the focus was on the old organochlorine pesticides, which were attached to particulate matter and generally disappeared from clear water. In the early 1980s information had accumulated that some herbicide compounds, which were generally more water-soluble and more widely used than the organochlorines, were being detected in both surface and ground waters. Policies were developed to reduce contamination of ground and surface water and regulatory limits and guideline levels were introduced for residues in drinking water.

Setting regulatory limits for pesticide residues in waters is complex. First we must define the type of water relevant to the proposed limit (e.g., drinking water, reservoir water, lakes and streams, ground water, water for aquaculture, irrigation water, and drinking water for farm animals). Secondly, should we adopt a risk-based approach, a "no more than reasonable if good practices are followed" approach, or a combination of the two? Different approaches will lead

to the setting of different maximum limits. A limit based on a risk to human health or to the environment may allow much higher levels of residue in the water than would ever occur in practice. An arbitrarily chosen maximum limit may be economically wasteful in requiring correction of harmless residues that do not meet the standard, while ignoring more hazardous contaminants that are technically not pesticides. An important principle is that the establishment of guideline levels or standards does not imply that the water quality may be allowed to degrade to the recommended levels.

Drinking water standards rely on a variety of criteria, which are difficult to comprehend-even for experts. When the standards are perceived as a dividing line between safe and unsafe, a drinking water level exceeding the standard level is of great concern to the public.

Regulatory limits for pesticide residues in waters should have the following characteristics: definition of the type of water, definition of the residue, a suitable analytical method for the residues, and an explanation of the basis for each limit.

Limits may be derived by applying a safety factor to a no-effect-level, or from levels occurring when good practices are followed, or from the detection limit of an analytical method, or directly by legislative decision. Limits have been most commonly developed for drinking water, but values have also been proposed for environmental waters, effluent waters, irrigation waters, and livestock drinking waters. The contamination of ground water is of concern because it may be used as drinking water and may act as a source of contamination for surface waters. Most commonly, drinking water standards have been applied to ground water.

The World Health Organization's (WHO) guideline values for drinking water for those pesticides exhibiting threshold toxicity effects are derived from the tolerable daily intake (TDI) or acceptable daily intake (ADI) by assuming daily consumption of 2 litres of water by a 60-kg adult. For pesticides that are highly persistent, have a high bioaccumulation potential, and are often found in food, only 1 % of the TDI is allocated to drinking water. In other cases, a default value of 10 % TDI is allocated to drinking water. National governments often follow the same procedure in principle, but the details are different.

Canadian pesticide residue guidelines for irrigation water take into account the phytotoxicity of the residues to sensitive crops. For non-herbicides or non-phytotoxic residues, an additional basis for guidelines would be the accumulation of residues in crops. Residues of a systemic pesticide in irrigation water could be taken up to produce a residue level in the crop exceeding the maximum residue limit (MRL). The maximum guideline limit would be set so that residues in the crop would not exceed the MRL. Canadian livestock water-quality guidelines are derived from animal toxicity studies. An additional concern, as with residues in crops from irrigation water, is the resulting residues in food commodities—in this case in meat, milk, and eggs. Farm animal feeding studies provide information on the relation between residue levels in the animal diet and the resulting residue levels in the animal tissues, milk and eggs. The feeding studies would allow calculation of the maximum residue intake from livestock drinking water before residues in animal commodities exceeded MRLs.

The same terminology may have different meanings in different systems. For example, guideline value (GV) to the WHO means a value calculated from a toxicology parameter, while in Australia a GV is at or about the analytical limit of determination, or a maximum level that might occur if good practices are followed. In New Zealand the GV is the concentration where aesthetic significance is influenced. The Australian health value (HV) is conceptually the same as the WHO GV. The New Zealand maximum acceptable value (MAV) or and the Canadian maximum acceptable concentration (MAC) are also conceptually the same as the WHO GV.

Each of the possible ways of defining the residues has its merits. A residue limit in water expressed as the sum of parent and toxicologically relevant transformation products makes sense where it is derived from the ADI. For monitoring purposes, where it is best to keep the residue definition as simple as possible for the sake of practical enforcement and economy, the parent or a marker residue is preferable. It is also possible for parent and degradation products (hydrolysis and photolysis products and metabolites) to become physically separated as the water moves through soil strata, which suggests that separate limits should be set for parent and important degradation products.

An analytical method must be available to measure the residue at a standard or guideline limit designed for surveillance or regulatory enforcement. The specified limit should be no lower than the method LOQ (limit of quantification), which is the lowest concentration where suitable recoveries are achieved (usually mean recoveries of between 70 % and 110 %). In some situations the limit must be set at a level at or below those where relevant biological effects are observed, which may require additional work to ensure that a suitable analytical method is available.

The Commission has made 12 recommendations for

regulatory limits for pesticide residues in water. The recommendations will act as a checklist for authorities introducing or revising limits or guidelines for pesticide residues in water.

The IUPAC Commission on Agrochemicals and the Environment Makes the Following Recommendations:

1. The terminology for pesticide residue limits in water should be harmonized. As a first step, IUPAC should prepare and issue recommended terminology for the various limits and guidelines for pesticide residues in water. International agencies and national governments would then be encouraged to adopt the terminology when introducing or revising their regulations or recommendations.
2. The aim or purpose of establishing a set of pesticide residue limits in water should be clearly enunciated so that they are used only for the intended purpose.
3. The nature of the water to which the pesticide residue limits apply should be defined and explained.
4. The methods for establishing pesticide residue limits in water should be described and should include the data requirements, assumptions, reasons for choice of factors (assessment, uncertainty or safety) and the nature of the water to which the limits apply.
5. The rationale for each pesticide residue limit should be explained publicly in a transparent way. The explanation should summarize the available data, draw attention to inadequacies or inconsistencies of data, and show in a logical way the derivation of the recommended value. The explanation should include, where relevant, the choice of factor (assessment, uncertainty, or safety), availability of analytical methods, and residue definition.
6. The compound or compounds to be included in a residue limit for water should be stated. It is preferable to set individual residue limits for parent pesticide and each relevant transformation product.
7. Analytical methods for residues in water should be developed with limits of quantification (LOQ) low enough to match concentrations related to relevant biological effects.
8. A pesticide residue limit in water that is designed for monitoring or regulatory purposes should be established at a level no lower than the LOQ of a practical analytical method.
9. A process designed to reduce the levels of pesticide residues in water should not introduce contaminants that pose new risks.
10. Guidelines for drinking water calculated from the acceptable daily intake (ADI) should follow the WHO system (60 kg body weight, consumption 2 litres/day, allocate 1 % or 10 % tolerable daily intake or ADI depending on the pesticide uses and properties).
11. Guideline levels should never be taken as a licence to degrade a water supply to the guideline levels.
12. Short-term deviations above a regulatory limit for residues in water do not necessarily mean that the water is unsuitable for the intended purpose. The amount and duration of the deviation should be subject to a risk assessment taking into account the basis for the regulatory limit.

www.iupac.org/publications/pac/2003/7508/7508x1123.html

Provisional Recommendations

IUPAC Seeks Your Comments. Provisional recommendations are drafts of IUPAC recommendations made widely available to allow interested parties to comment before final publication in *Pure and Applied Chemistry*.

Terminology in Soil Sampling

The need to be understood is the first objective of writers and speakers, be it a poet or a scientist. But there is a difference: the scientist must be sure that, within a stated context, the terms used in articles, publications, or in the daily conversation among colleagues, are intended by all in the same precise way, without any possible ambiguity. As already pointed out by IUPAC Recommendation 1990, "Nomenclature for Sampling in Analytical Chemistry," it is unacceptable that scientists are unable to orient themselves in a sampling or analytical process. This can occur if the terms used are not well defined. Moreover, to better appreciate the development of new theories or concepts, progressive updates can be necessary. To this end, on the basis of the existing terminology documents and of the most recent knowledge in the field of soil sampling, an up-dated terminology in sampling (specifically soil sampling) is recommended.

Comments by 30 November 2003

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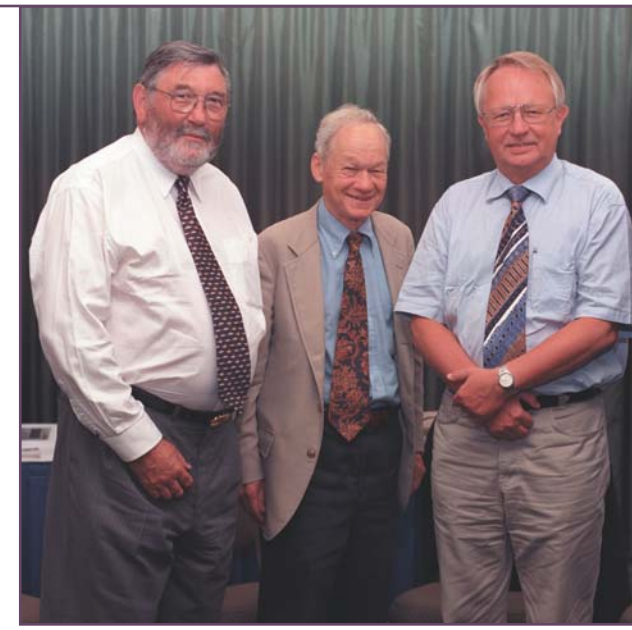
www.iupac.org/reports/provisional/abstract03/fajgelj_301103.html

On the Claims for the Discovery of Elements 110, 111, 112, 114, 116, and 118 (IUPAC Technical Report)

P. J. Karol, H. Nakahara, B.W. Petley, and E. Vogt
Pure and Applied Chemistry,
Vol. 75, No. 10, pp. 1601–1611 (2003)

Name and Symbol of Element of Atomic Number 110 (IUPAC Recommendations 2003)

J. Corish and G. M. Rosenblatt
Pure and Applied Chemistry,
Vol. 75, No. 10, pp. 1613–1615 (2003)



Naming element 110—(from left) John Corish and Gerd Rosenblatt (IUPAC Inorganic Chemistry Division) and Sigurd Hofmann (GSI, in Darmstadt) at the IUPAC Council in Ottawa, 16 August 2003.
Q&A by S. Hofmann about Ds are available online at <www.iupac.org/news/archives/2003/aboutDs.html>.

The IUPAC/IUPAP Joint Working Party (JWP) reports on the claims—based on articles submitted by December 2001 from the various claimants—for the discovery of elements 110, 111, 112, 114, 116, and 118. For each element, a detailed discovery profile precedes the JWP assessment.

The JWP, comprised of four independent experts, works with the criteria as previously established and used in 1992 and 1999 during the examination of the transfermium elements. While following strict criteria, the intention of the JWP is not to set a higher standard for "discovery" than that applied elsewhere in science, but rather to conform to a uniform, consistent basis for definitive observation and interpretation. During their deliberations, the JWP balances a sensibly conservative stance with the need for reasonable flexibility.

For element 110, the priority of discovery is unchanged and the JWP re-endorses the confirmed synthesis of element with atomic number 110 by the team at Gesellschaft für Schwerionenforschung (GSI) led by S. Hofmann; re-assessment was necessitated by revelations at the Berkeley and GSI laboratories of some apparently fabricated or partially modified decay chains. Concurrently, and in accordance with IUPAC procedures, the discoverers were invited to propose a name and symbol for the new element. The discoverers proposed the name **darmstadtium**, and the symbol **Ds**, which were both then recommended by the Inorganic Chemistry Division and approved by the IUPAC Council at its most recent session on 16 August 2003 in Ottawa (see IUPAC recommendations published in *Pure and Applied Chemistry*, Vol. 75, No. 10, pp. 1613–1615, 2003).

For element 111, the JWP revisited the 1995 report by Hofmann *et al.*, and also reviewed their most recent 2002 publication. The JWP has decided to assign priority of discovery of that element by that collaboration. In its 2001 report, the JWP concluded that the results of the collaboration of Hofmann *et al.* were definitely of high quality, but there was insufficient internal redundancy to warrant certitude at that stage. The additional observations presented in their 2002 publication were considered convincing, despite the lack of independent confirmation of the isotopes observed. The decision to assign priority of discovery is justified not only on the basis of the quality of the work and reproducibility, but also on the fact that previously characterized nuclides were identified as part of the detection sequence(s). Again, following the procedure for naming new elements, the discoverers at GSI have been asked to propose a name and symbol for the new element. A provisional recommendation is expected soon.

For elements 112, 114, and 116, the collaborations of Hofmann *et al.* and of Oganessian *et al.* produced high-quality data with plausible interpretations. However, confirmation by further results is needed to assign priority of discovery for these elements. The JWP was not persuaded that other collaborations have satisfied the discovery criteria.

For element 118, observation of the element has been retracted by the original investigators. No assessment by the JWP was performed.

www.iupac.org/publications/pac/2003/7510/7510x1601.html
www.iupac.org/publications/pac/2003/7510/7510x1613.html

Measurement of the Thermodynamic Properties of Single Phases, Vol. VI

A. Goodwin, K. N. Marsh, and W. A. Wakeham
Elsevier, 2003
ISBN 0-444-50931-3

The editors of this volume were assigned the task of assembling an international team of distinguished experimentalists to describe current techniques for measuring the thermodynamic quantities of single phases, consisting of both pure fluids and compositionally complex mixtures, over a wide range of conditions. The resulting volume contains a valuable summary of a large variety of experimental techniques applicable over a wide range of thermodynamic states, with an emphasis on the precision and accuracy of the results obtained. Those interested in the art of measurements, and in particular engaged in the measurement of thermodynamic properties, will find this material invaluable for the guidance it provides towards the development of new and more accurate techniques. Readers will find that the text has a strong practical bias and includes both detailed working equations and figures for the experimental methods. The volume addresses a general audience of academics, graduate students and industrial readers, and is the most comprehensive text in this field since the publication of *Experimental Thermodynamics Volume II* in 1975.

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

Progress in Polymer Science and Technology

Mao Xu (ed.)
Macromolecular Symposia, Vol. 195
Wiley-VCH, 2003, pp. 1–327
ISBN 3-527-30699-4

This issue contains some of the plenary lectures and invited lectures presented at the 2002 IUPAC World Polymer Congress (The 39th International Symposium on Macromolecules) held in Beijing, China, from 7–12 July 2002. Around 1300 attendees from 44 countries actively participated in the various activities of the Congress, which was organized by the Polymer Division of the Chinese Chemical Society.

The scientific program of the Congress involved plenary sessions and the following scientific sessions:

- polymer synthesis and reactions
- structure and properties of polymers
- macromolecular architecture
- polymer blends and composites
- functional polymers
- bio-related and medical polymers
- polymers and environment
- polymer engineering and processing

The conference covered all the main fields of polymer science and technology. There were a total of 1072 papers delivered, including 380 oral and 692 poster presentations.

www.iupac.org/publications/macro/2003/195_preface.html

Solubility Equilibria—in Honor of Heinz Gamsjäger

Monatshefte für Chemie/Chemical Monthly,
Vol 134, No. 5, pp. 619–790, 2003

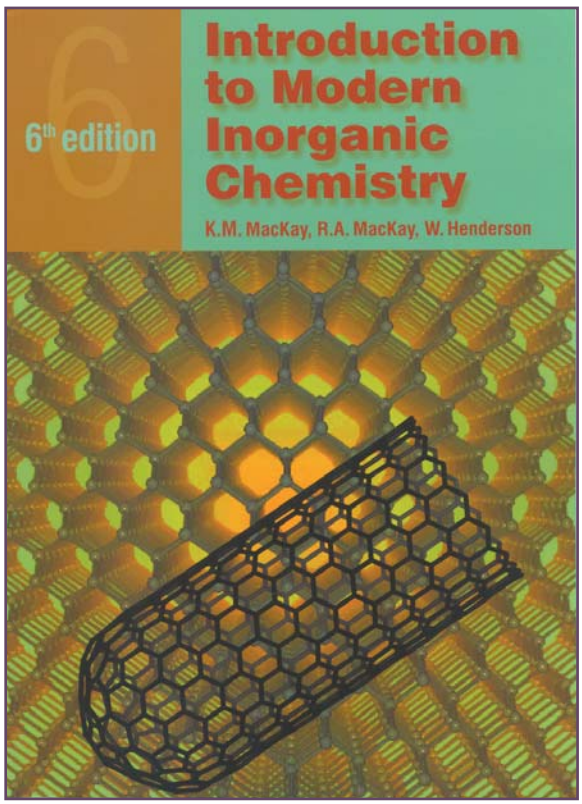
To honor Professor Heinz Gamsjäger, chairman of the IUPAC Subcommittee on Solubility and Equilibrium Data (SSED), on the occasion of his seventieth birthday, *Monatshefte für Chemie/Chemical Monthly* published a special issue on "Solubility Equilibria," edited by Erich Königsberger. The authors of the contributions to this special issue have served for many years on the IUPAC Commission on Solubility Data (now SSED) and edited and contributed to numerous volumes of the IUPAC-NIST Solubility Data Series (SDS).

In the preface to the special issue, Mark Salomon, editor in chief of SDS, gives an overview of Heinz Gamsjäger's scientific career from 1956, when he was awarded an M.Sc. degree (Dipl.-Ing. Technical Chemistry) by the Technical University Graz, until the present as an emeritus professor of physical chemistry at the University of Leoben, Austria, and chairman of SSED.

Gamsjäger was never one to rest; he was a visiting professor at many foreign universities, and in 1981 he was also an advisor to the Japan Society for the

Promotion of Science Fellowship for Research in Japan. He has served on the editorial board of *Monatshefte für Chemie/Chemical Monthly* since 1998, and on the editorial board of the IUPAC-NIST Solubility Data Series since 1994. Gamsjäger has also been a major driving force in the IUPAC Solubility Data Project since 1990 serving as Secretary of IUPAC Commission V.8 on Solubility Data from 1994 to 2000, and as Chairman of SSED from 2001 to the present. In his capacity as a member of IUPAC Commission and SSED, Gamsjäger has provided guidance, kind criticism, and friendship to his colleagues on SSED and has been instrumental in coordinating the efforts of over 100 distinguished scientists worldwide who are active in the work of SSED.

The papers published in this special issue of *Monatshefte* represent contributions from Professor Gamsjäger's close friends and colleagues on SSED. The scope and creativity of these contributions are a tribute to his influence and interaction with his colleagues. The scientific topics cover a variety of solubility phenomena, including general aspects of gas-liquid solubilities (P. G. T. Fogg), gas-liquid and liquid-liquid solubilities of chloromethanes in water (H. L. Clever), and mutual water-hydrocarbon solubilities (A. Maczynski *et al.*). Solid-liquid solubility studies include double salt formation in ternary transition metal-alkali metal halide systems (Chr. Balarew and S. Tepavitcharova), solubilities in ternary aqueous systems involving Cu(II) (L. V. Chernykh *et al.*) and magnesium salts (F. Bousmina *et al.*), the crystallisation and phase stability of calcium sulfate based salts (D. Freyer and W. Voigt), and a new evaluation of the solubility constants of the three calcium carbonate polymorphs (A. De Visscher and J. Vanderdeelen). Other reviews deal with solubilities in mixed solvents of silver halides (W. E. Waghorne) and alkali metal fluorides (G. Senanayake and G. Hefter) and with solubility phenomena in ternary water-salt systems under sub- and supercritical conditions (V. Valyashko and M. Urusova). Solid-liquid solubilities also extend to lanthanide chlorides in molten alkali metal chlorides (M. Gaune-Escard and L. Rycerz), environmental aspects of Pb(II) arsenate stabilities (M. C. F. Magalhães and M. C. M. Silva), and an application of solubility measurements to medicine (G. Sadovska *et al.*).



Introduction to Modern Inorganic Chemistry

K. M. MacKay, R. A. MacKay and W. Henderson
Nelson Thornes, 6th edition, 2002.
ISBN 0 7487 6420 8

reviewed by Bernard Meunier

It's always a pleasure to have a look at a new edition of a popular (inorganic) chemistry textbook: What has been done to make it better? Has it been made more attractive? These are two key questions for teachers who are facing a new generation of students. How can one teach these young people who have been trained mainly by videos and partially by reading books? Well, if you are looking for an attractive and comprehensive book for teaching inorganic chemistry, then you will be highly interested in this the sixth edition of *Introduction to Modern Inorganic Chemistry* by Ken MacKay, his wife Ann, and Bill Henderson.

What is attractive about this book? First, it provides an exhaustive overview of the fundamental bases of inorganic chemistry. Second, boxes located in the margins or in the middle of pages provide

enlightening facts about inorganic chemicals as they relate to everyday life: phosphates and lake water, ozone in the stratosphere, nuclear power and the problem of fission products, titanium oxide as white pigment, and more. I am convinced that these linkages between inorganic chemistry and real life are essential for attracting talented young students to the field.

Another of the book's important features is a further reading appendix that provides a long list of other textbooks devoted to inorganic chemistry to facilitate the reader's future choices. This list is completed by bibliographic data that have been used (or are recommended) by the authors to document each chapter of the book.

Now, if you are ready to rush out and buy this book, you should know that it has 20 chapters, three appendices, and a well-organized index. Chapters 1 to 3 are devoted to the basics of inorganic chemistry (nomenclature, atomic orbitals, covalent bonds, . . .). Chapters 4 and 5 describe polyatomic covalent molecules and solid-state chemistry. The principles of solution chemistry, mainly experimental methods and the general properties of the elements in relation to the periodic table, are reported in chapters 6, 7, and 8. Chapters 9 to 13 focus on hydrogen, the 's' elements, the lanthanides, and the actinides. The following chapters (14–16) present the transition metals and their complexes. The elements of the 'p' block and selected topics in main group chemistry are presented in chapters 17 and 18. Chapter 19 is a short, useful presentation of electron density determination, fullerenes, carbon nanotubes, and dendrimers. The final chapter looks at the biological, medicinal, and environmental aspects of inorganic chemistry. Appendix B is a list of common polydentate ligand. Appendix C is a summary of molecular symmetry and point groups.

If you are not satisfied with this book, the authors kindly mention the Web sites of other publishers of textbooks in inorganic chemistry on page 585!.Thanks to the authors for this valuable book and good luck with the 7th edition.

Bernard Meunier <bmeunier@lcc-toulouse.fr> is from the CNRS Laboratoire de Chimie de Coordination in Toulouse, France, and is a current titular member of the IUPAC Inorganic Chemistry Division and the Division representative on the Committee on Chemistry Education.

High Temperature Materials Chemistry

by Michio Yamawaki and Gerd M. Rosenblatt

The IUPAC Conferences on **High Temperature Materials Chemistry** (HTMC) were initiated by the Inorganic Division's Commission on High-Temperature Materials and Solid State Chemistry in 1977 and have become the premier international venue for exploring the combination of chemistry and materials science as they affect understanding, production, and utilization of high-temperature materials.

The eleventh conference in the HTMC series was held 19–23 May 2003 in Tokyo, Japan, the first time that an HTMC conference has been held in Asia. It was organized by Prof. Michio Yamawaki of the University of Tokyo with the help of Professors T. Terai, S. Nagasaki, and K. Morita. The Tokyo conference provided significant opportunities for constructive interchange between basic and applied researchers, with particular emphasis on material synthesis, nuclear energy application, and electronic functional materials. The fundamental contributions were primarily in the areas of thermodynamics, gas phase/liquid phase/solid phase chemistries, and interface chemistry.

There were about 140 papers and 140 participants from 16 countries at this successful meeting. The number of papers and participants was somewhat smaller than anticipated because of the unexpected spread of the SARS epidemic in some parts of the world and because of the Iraq war.

To ensure productive dialog between basic science and applications and among industry, research laboratory, and academic scientists, the conference, following tradition, was held with no parallel sessions and with lots of opportunities for formal and informal discussions. The majority of the papers were presented in poster sessions. In addition, there were 7 invited plenary lectures, 18 keynote lectures, 6 shorter oral presentations, and 5 hands-on demonstrations of computerized thermodynamic databases.

Among the plenary lectures, to be published in a future issue of *Pure and Applied Chemistry*, were the following:

- "Phase Diagram Calculation and its Application to Alloy Design" (K. Ishida, Tohoku University, Sendai, Japan)
- "Interaction of Water Vapor with Oxides at Elevated Temperatures" (N. Jacobson, NASA Glenn Research Center, Cleveland, USA)
- "Crystal Growth of Superconductive Oxide from Oxide Melts" (Y. Shiohara, International Superconductivity Technology Center, Tokyo, Japan)
- "Stability of Li_x, Li_xH_y and Li_nO_m Clusters and their Relevance to Fusion, Primodal, and Hypervalent Molecules" (C. H. Wu, Max-Planck Institute for Plasma Physics, Garching, Germany)
- "Actinide Research Related to Nuclear Fuel and Fuel Cycle" (J. P. Glatz, ITU, Karlsruhe, Germany)

Keynote lectures by leaders of their fields covered the following topics: high-temperature mass spectrometry, NMR measurement and X-ray absorption fine structure (XAFS) techniques; a number of forefront experimental and modeling studies of ceramic materials and oxides; and studies of alloys, photocatalytic materials, SnO_2 nanotubes, molten salts, supercritical fluids and fuel cells. These papers, along with the other oral and poster presentations, illustrated the tremendous variety of physical and chemical techniques that are utilized, and of systems that are studied, under the umbrella of "high-temperature materials."

The two meetings that immediately preceded HTMC-XI in this well-established and successful IUPAC series were in Jülich, Germany (2000) and State College, Pennsylvania, USA (1997). Following a pattern of meeting every three years on a different continent, the next conference, HTMC-XII, is scheduled for 2006. It will be held in Vienna, Austria, and will be hosted by Prof. Adolf Mikula of the University of Vienna <Mikula@ap.univie.ac.at>.

Michio Yamawaki <yamawaki@q.t.u-tokyo.ac.jp> is professor at the University of Tokyo Graduate School of Engineering and HTMC-XI Conference Organizer. Gerd M. Rosenblatt <grosenblatt@lbl.gov> works in the Materials Sciences Division of the Lawrence Berkeley National Laboratory in California and is also president of the IUPAC Division of Inorganic Chemistry.

Plasma Chemistry

by Stephen Girshick

The **16th International Symposium on Plasma Chemistry**, ISPC-16, was held in Taormina, Italy, from 22–27 June 2003, under the auspices of IUPAC and of the International Plasma Chemistry Society. The symposium was organized by an International Organizing Committee chaired by Prof. R. d'Agostino of the University of Bari, Italy, and by a Local Organizing Committee, co-chaired by Prof. d'Agostino, P. Capezzuto, and M. Capitelli.

The symposium was attended by 641 registered participants from 44 countries, including Italy (103), Japan (103), France (92), Germany (67), Czech Republic (41), the United States (36), Canada (28), Russia (23), the Netherlands (14), the United Kingdom (14), Switzerland (12), Poland (11), South Korea (11), and 31 other countries. The excellent attendance and widespread international participation reflect the increasing importance and vitality of the field of plasma chemistry. However, we note with regret that none of our Chinese colleagues were able to attend due to the SARS epidemic.

The symposium was preceded (18–20 June) by three separate summer schools held in Taormina, devoted to Low-Pressure Plasma Processing of Materials, High-Pressure Plasma Processing of Materials, and Plasma Processes for Microelectronics. On 21 June a workshop was held on Industrial Applications of Plasma Chemistry. There were 57 total participants for the summer schools and 94 for the workshop.

The symposium itself consisted of 810 contributions, including 5 plenary lectures, 15 topical invited talks, 20 invited talks for three special sessions, 116 other oral presentations, and 654 posters. Attendees received a book containing one-page abstracts of all contributions, together with a compact disk containing the full proceedings, including the full-length contributed papers and abstracts of the topical and plenary invited talks. The full texts of the plenary and invited lectures will be published in *Pure and Applied Chemistry*. The book of abstracts and CD proceedings were edited by R. d'Agostino, P. Favia, F. Fracassi, and F. Palumbo. This was the first time that the full ISPC proceedings, well over 4000 pages, were published on CD.

Plenary lectures were presented as follows:

- M. Kuzuya on "Recent Advances on Plasma Techniques for Bio-Medical and Drug Engineering"
- M. Wertheimer on "Plasmas and Polymers"
- A. Fridman on "Non-thermal Atmospheric Pressure Discharges"
- N. Sadeghi on "High Sensitivity Laser-Based Techniques Applied for Plasma Diagnostics"
- P. Fauchais on "Plasma Spraying from Thick to Thin Coatings and Micro to Nano Structured Coatings"

Among the topics covered in the regular sessions were fundamentals of plasma-surface interactions; nonequilibrium effects and atmospheric pressure plasma processes; plasma sources; plasma deposition of inorganic and hard coatings; clusters, particles, and powders; plasma chemical synthesis; and hybrid plasma/radiation processes. In addition, special sessions were organized on biomedical applications of plasma processes, plasma treatment of wastes, and atmospheric pressure plasma processes.

The Plasma Chemistry Award, recognizing outstanding achievement over a career in the field of plasma chemistry, was presented to Prof. Charles H. Kruger of Stanford University. The Best Paper Awards were given to three young scientists: Gudrun A. Saevarsdottir, of the University of Iceland, for "A Novel Approach to Cathode/Anode Modelling for High Current AC-Arcs"; Shinsuke Mori, Tokyo Institute of Technology, for "Numerical Analysis of Carbon Isotope Separation by Plasma Chemical Reactions in CO Glow Discharge"; and Peter Messerer, Munich University of Technology, for "Characterisation of a Double Inductively Coupled Plasma Reactor."

Elections were held during the symposium for several openings on the Board of Directors of the International Plasma Chemistry Society. The next president of the society will be Kunihide Tachibana, of the University of Kyoto, Japan, and the next vice president will be Jean-Michel Pouvesle, of the University of Orléans, France.

The next International Symposium on Plasma Chemistry, ISPC-17, will be held in Toronto, Canada, 7–12 August 2005.

Stephen Girshick <slg@tc.umn.edu> is professor at the Chemical Engineering and Materials Science Department of the University of Minnesota, and was IUPAC representative at ISPC-16.

Organo-Metallic Chemistry

by Mark Lautens

OMCOS-12 (**Organo-Metallic Chemistry Directed Towards Organic Synthesis**) was held in Toronto, Canada, from 6–10 July 2003. The inaugural conference in this series was held some 25 years ago in Fort Collins, Colorado, USA. In the intervening years, OMCOS has grown to become a very successful and well-established event that brings together chemists from academia and industry to share results in the areas of catalysis, new organometallic reagents and reactions, and new materials chemistry.

OMCOS-12 was organized in collaboration with Rick Friesen (Merck Frosst in Montreal), with much-

appreciated assistance from our secretariat Sue McClelland and our co-organizers William Tam, Eric Fillion, Andrei Yudin, Robert Batey, and Andre Charette. Generous financial support from more than 20 companies and the University of Toronto (chemistry department, dean, and provost) were absolutely necessary given the complex conditions under which the conference was held. Global concerns over SARS and Toronto's central role in that unfolding drama made everyone from sponsors to speakers, attendees, and organizers uncertain of the viability of the conference. Two outbreaks of SARS at key moments (abstract registration and in the weeks prior to the final registration) led the organizing committee to constantly re-evaluate the feasibility of holding the event. Of course, substantial reductions in the number of participants also put the financial health of the conference at great risk. We were very fortunate and pleased that the speakers agreed to give their lectures under the circumstances, and the scientific content of the conference was never compromised. The conference was held as planned.

The meeting was held in the Isabella Bader Theatre on the campus of the University of Toronto. This newly constructed building is an ideal venue for a medium-sized conference and the proximity of the speakers to the audience provided a good atmosphere for scientific exchange and enthusiastic participation by the conferees. A total of 300 chemists from 20 countries attended the plenary, invited, and short lectures, and presented approximately 100 posters. OMCOS-12 had a high proportion of students attending the meeting, giving short talks and/or posters. Seven plenary lectures (Echavarren, Hartwig, Hayashi, Helmchen, Kocienski, Marek, Mikami) and 15 invited lectures were presented on the latest advances in asymmetric catalysis, new metal-promoted reactions, new catalysts, mechanistic studies, and the utility organometallic reagents in synthesis. The highlight of the conference was the OMCOS Prize Lecture given by Professor Kyoko Nozaki of Tokyo University. We are grateful to the Yen Chuang Foundation and Springer Verlag for the support necessary for the OMCOS Prize.

OMCOS-13 will be held in Geneva, Switzerland, from 17–21 July 2005. Peter Kündig is the chair of the Organizing Committee.

Mark Lautens <mlautens@alchemy.chem.utoronto.ca> is the AstraZeneca Professor of Organic Synthesis in the Department of Chemistry at the University of Toronto, and was the chairman of OMCOS-12.

Analytical Chemistry in Africa

by Nelson Torto

The **Inaugural Conference of the Southern and Eastern Africa Network of Analytical Chemists** (SEANAC) was held in Gaborone, Botswana, from 7–10 July 2003. Since 1999, the analytical chemistry section of the Department of Chemistry at the University of Botswana has been hosting annual international analytical chemistry workshops aimed to enhance the interaction of academia and industry. SEANAC was formed in February 2002 during a Sida (Swedish international development co-operation agency) funded workshop where it was agreed to pool analytical chemistry expertise on issues pertaining to the African continent. SEANAC's main objectives are to promote analytical chemistry through collaboration, research, research training, teaching, and information sharing; to facilitate inventory, access, operation, maintenance, and repairs of analytical equipment; and to collaborate with organizations with similar aims.

The theme of SEANAC's inaugural conference was "Networking for Regional Prosperity." At least 20 different African countries were represented, as well as countries from North America, Europe, and the Middle East. Participation by upcoming scientists and scholars of repute was made possible through the sponsorship of delegates by the Organisation for Prohibition of Chemical Weapons (OPCW), USA National Science Foundation, Sida, Third World Academy of Sciences, Sigma Xi International and the Commonwealth Science Council.

Before the inaugural conference, graduate students, technicians, chemists, and trainers participated in two-day workshops. Dr. Ron Majors of Agilent Technologies, USA, held a workshop on "Solid Phase Extraction Sample Preparation"; Dr. Gaspar Mhinzi of the University of Dar-es-Salaam, Tanzania, held a workshop on chemometrics; Prof. James Holcombe of the University of Texas at Houston, USA, held a workshop on "Presenting and Publishing Scientific Data"; and Prof. Omowunmi Sadik of Binghamton University held a workshop on mentorship. The organizers have posted the workshop material on the SEANAC Web site.

The SEANAC inaugural conference was officially opened by the Minister of Communication, Science, and Technology, Hon. Boyce Sebetela, after delegates were given an overview of the functions of IUPAC by Prof. Roger Smith (UK), who attended as an IUPAC

representative. The plenary lectures on the first day were given by Prof. Sadik (USA), Prof. Lo Gorton (Sweden), Prof. Damia Barcelo (Spain), and Dr. Roland Schnurpfeil (Germany). Sadik gave an excellent talk on trends and challenges in biochemical sensors for chemical and environmental monitoring. Of relevance to Africa was the promise shown by biosensors for rapid diagnosis of HIV as an alternative to ELISA. Barcelo discussed the integration of chemical analysis and the effects of studies of carps and yeast on endocrine disruptors in sewage treatment plants receiving waters and sediments. In his plenary lecture, Gorton outlined the fundamental and applied aspects of enzyme-based amperometric biosensors. Schnurpfeil gave an interesting account of the Proteineer: the integrated mass spectrometry based proteomic suite that facilitates the acquisition of information from various samples.

In the first plenary lecture on the second day, Prof. Gyorgy Marko-Varga (Sweden) discussed proteomics in disease. The other plenary lectures on this day were given by Prof. Roger Smith, on the problems of accurate method transferability in HPLC, and Prof. Douglas Rawlings (South Africa), on "The Mobility-Assisted Dissolution of Minerals and its Use in the Mining Industry." The last two plenary lectures were by Prof. S. B. Jonnalagadda (South Africa), who spoke about the "Scope and Potential of Seawater in Treatment of Sewage Waters" and Drs. Walter Benson and Albert Poland of IOCD, who talked about African analytical chemistry trainers.

The plenary lectures given on the third day were by Profs. Jorge Gardea-Torresdey (USA), Luc Nagels (Belgium), Robert McCrindle (South Africa) and Prof. Geoffrey Kamau (Kenya). Gardea-Torredery gave an interesting lecture on "Phytoremediation Technologies for the Removal of Toxic Heavy Metal Ions from Contaminated Waters and Soil." Nagels address was on "Potentiometric Detection for HPLC is a Reality-Which Classes of Ionic Organic Substances are the Targets?" McCrindle discussed the "Speciation of Cr(III) and Cr(VI) in Cement by AAS." Kamau gave a lecture on "Myoglobin as a Potential Catalyst for the Decomposition of Persistent Organohalide Pollutants: Selective Control and Rate Enhancement." Dr. Ron Majors (USA) concluded the plenary session with his lecture on "New Directions in HPLC Column Technology for Rapid, Efficient, and Selective Separations."

Sigma Xi Interational sponsored the prize for the best oral and poster presentation. Because of the high quality of the oral presentations, the team of judges (Profs Holcombe, Gardea-Torresdey, Lindner, and Sadik) decided to contribute their own money in order to give two prizes for the best oral presentation instead of one. The prizes for best oral presentation were awarded to Harriet Okatch, a Ph.D. student at the University of Botswana, and Solommon Ssenyange, a PhD student at the University of Alberta, Canada. The award for best poster presentation was given to Ms. Aoife Morrin, a PhD student at the University of the Western Cape, South Africa.

On the last day of the conference plenary lectures were given by Profs Erno Lindner (USA), James A Holcombe (USA), Dr. Ghirma Moges (Netherlands), and Profs Malin Akerblom and Henrik Kylin. Lindner talked about "Microfabricated Electrochemical Sensors and Their Application in Bedside Analysis and Homecare Diagnostics." Holcombe lectured on "Trace Metal Analysis and Development of a Novel Means of Metals Remediation in the Environment Using Immobilized Biopolymers." Moges discussed glutamate oxidase advances. Akerblom and Kylin discussed "Low-Tech Methods for Pesticide Residue Analysis." Dr. John Makhubalo from OPCW provided an overview of the activities and opportunities within OPCW.

Despite the fact that the conference venue had to be changed two weeks before the conference due to U.S. President Bush's visit to Botswana, the conference proceeded without any problems. The 150 conference delegates had the opportunity to listen to 115 lectures that included 18 keynote lectures as well as 50 poster presentations over a 3-day period. The set-up facilitated formal and informal interaction, as all lecture sessions were in one room. All credit goes to the delegates, organizing committee (Dr. J. Catherine Ngila, secretary; Mathew Nindi, treasurer; and the program officers, Drs. Gerald Sawula and Veronica Obuseng), the international advisory committee, and the sponsors for making the inaugural conference a success. The next SEANAC meeting is scheduled for 2005 in Botswana.

Nelson Torto <torton@mopipi.ub.bw> was the chairman of the Organizing Committee, SEANAC secretary general, and conference editor for the *Pure and Applied Chemistry* issue for the SEANAC Inaugural conference.

qPCR Technology

3–6 March 2004, Freising-Weihenstephan, Germany

The **1st International qPCR Symposium & Application Workshop** will be held 3–6 March 2004 at the Center of Life Science in Freising Weihenstephan, Technische Universität München.

The polymerase chain reaction (PCR) is the most sensitive technique to detect low-abundance mRNA and minute amounts of DNA typically present in tissue samples. Real-time reverse transcription PCR (qPCR or kinetic RT-PCR) is rapidly becoming the method of choice for quantitative gene expression analysis and molecular diagnostics owing to its high sensitivity, excellent reproducibility, and wide dynamic quantification range. However, this ultra-high sensitivity makes qPCR susceptible to experimental error, variations in experimental protocols, and the presence of contaminants in complex biological samples. Successful applications of qPCR require understanding of the practical problems associated with sample handling, including careful experimental design, assay optimization, appropriate validation, and proper data treatment.

The symposium will focus on all aspects of qPCR technology and its applications in research and diagnostics. Leading academic researchers and industrial contributors in the field will participate in the symposium, which will provide an arena for fruitful discussions between researchers of different backgrounds. More than 35 internationally renowned speakers will be participating in a lively and exciting program, enabling the valuable exchange of information in the qPCR field.

The symposium and associated Application Workshop offer an overview of the present knowledge and future developments in qPCR technology and its wide applications. The workshop will offer hands-on training by leading experts in qPCR. Parallel to the symposium, an industrial exhibition will take place, featuring real-time PCR cyclers, kit producers, nucleic acid purification systems, enzyme producers, plasticware suppliers, and others.

www.wzw.tum.de/gene-quantification/qpcr2004

Heterocyclic Chemistry

9–10 March 2004, Gainesville, Florida, USA

Continuing a highly successful series, the **5th Florida Heterocyclic Conference** will be held 7–10 March 2004. The conference will open with a Welcome Mixer on the evening of Sunday 7 March. On 8 March, delegates will have three options: (i) Professors Dan Comins and Alan Katritzky will give a six hour overview of heterocyclic chemistry, providing an opportunity for chemists who are not familiar with all its aspects to gain an insight into the fundamental concepts underlying the subject; (ii) oral presentations on a wide variety of heterocyclic topics; (iii) a half-day hands-on practical workshop entitled "Microwaves Applied to Preparative Organic Chemistry." A poster session combined with a buffet supper will follow that evening. On 9 and 10 March, Tuesday and Wednesday, 12 experts from academia and industry will present plenary lectures with results from their latest research.

Organic and medicinal chemists of Ph.D. or M.Sc. level, particularly those with industrial experience, as well as industrial chemists from the pharmaceutical, biotech, agrochemical, colorants, flavors and fragrances, and chemical industries are encouraged to attend. Attendees will have the opportunity to present a poster or to make an oral contribution at this meeting, if arranged in advance.

Registration includes all conference sessions; buffet supper and wine at the mixer on 7 March and at the poster section on 8 March; lunches and refreshments on 8, 9, and 10 March; and a copy of the conference manual with notes on the lectures and the heterocyclic course.

The 5th Florida Heterocyclic Conference will follow a conference on "Microwave Applications to Chemistry" organized by CEM Corporation ("Innovators in Microwave Technology"). A reduced rate is available for attendees at both conferences.

See Calendar on page 34 for contact information

www.arkat-usa.org/ark/conferences/FLOHET/introduction4.htm

How to Apply for IUPAC Sponsorship

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

Macromolecules

5–8 April 2004, Stellenbosch, South Africa

The **7th Annual and UNESCO/IUPAC Conference on Macromolecules**, with special sessions on polymers and medicine, nanotechnology and degradation, will be held 5–8 April 2004 in Stellenbosch, South Africa. The UNESCO Introductory Course will precede the meeting on 3–4 April.

Since 1998, this continuing series of conferences has been held annually at the UNESCO Associated Centre for Macromolecules & Materials, University of Stellenbosch, South Africa.

The conference will have three mini-symposia, each of 1–2 days, with overlap where necessary to complete the conference in four days. The mini-symposia are as follows: polymers in medicine, polymers in nanotechnology, and polyolefin degradation.

The program will consist of plenary and invited speakers, as well as other oral presentations and poster sessions.

See Calendar on page 34 for contact information

www.sun.ac.za/unesco/Conferences/Conference2004/home2004.htm

Polymer Biomaterials

11–15 July 2004, Praque, Czech Republic

The **66th PMM—43rd Microsymposium Polymer Biomaterials: Biomimetic and Bioanalogous Systems** will bring together experts from academia and industry who wish to benefit from combining the approaches of polymer chemistry, surface chemistry, and materials science, biochemistry, molecular and cell biology, and medicine.

Through incorporation of biomimetic structures in synthetic polymers and their surfaces, new advanced biomaterials for biology and medicine can be developed and, vice versa, by using bioanalogous processes and biosynthetic pathways, unique polymers can be produced.

Topics of the conference will include the following:

- chemistry, physics, and biology of biomimetic structures on polymer surfaces and their interactions with biomacromolecules, cells, and components of living tissues
- molecular recognition, surface patterning, bio-functional assemblies, biosensing, and biohybrid systems
- polymer biomaterials as scaffolds for cell therapy, tissue regeneration, and tissue engineering
- synthesis, processing, functionalization, and interactions at biomaterial-cell interfaces
- bioanalogous processes in the synthesis of polymers
- development of bioanalogous polymer systems

Approximately 6 to 9 main lectures are planned, with 18 to 24 special lectures. Those participants who wish to present a special lecture will be asked to submit a brief summary with their preliminary registration card to the P. M. M. Secretariat before 31 December 2003.

See Calendar on page 35 for contact information

www.imc.cas.cz/sympo/43rdmicros.html

Photochemistry

17–22 July 2004, Granada, Spain

The **XXth IUPAC Symposium on Photochemistry** will be held in the Granada Conference and Exhibition Centre, Granada, Spain, 17–22 July 2004. A number of scientists of international status will give lectures covering a wide range of highly relevant, timely, and cutting-edge photochemical topics. In addition to the plenary lectures, there will be invited lectures, oral communications, and posters, organized within special workshops devoted to all major areas of photochemistry.

Special effort has been placed on keeping registration fees and other costs reasonable, and participation of young researchers (Ph.D. students and post-docs) will be encouraged and facilitated. Ample opportunities will be offered for both organized and spontaneous interaction between experienced and young photochemists.

In addition to the attractive scientific program, the local Organizing Committee has put together a social and cultural program for delegates and their accompanying guests. Granada and the Andalucia region offer many cultural attractions, excellent restaurants, shopping, and sightseeing possibilities.

See Calendar on page 35 for contact information

www.ugr.es/~xxiupacs/iupacxx.htm

Mark Your Calendar

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

2003

12–14 November 2003 • Bio-Based Polymers • Saitama, Japan
1st International Conference on Bio-based Polymers (ICBP 2003)
Dr. Yoshiharu Doi, Polymer Chemistry Laboratory, RIKEN, 2-1 Hirosawa,Wako-shi, Saitama 351-0198, Japan, Tel.: +81 48 467 9402, Fax: +81 48 462 4667, E-mail: ydoi@postman.riken.go.jp

12–16 November 2003 • XML Data Dictionary and the IUPAC Chemical Identifier • Gaithersburg, Maryland, USA
Dr. Steve Stein, E-mail: steve.stein@nist.gov
<www.iupac.org/projects/2002/2002-022-1-024.html>

24–27 November 2003 • Polymers • Bangkok, Thailand
The 8th Pacific Polymer Conference
Prof. S. Tantayaanon, Chulalongkorn University, Department of Chemistry, Bangkok, 10330, Thailand, Tel.: +66 2 218 4968, E-mail: supawan.t@chula.ac.th

2004

6–9 January 2004 • Polymer Characterization • Guimaraes, Portugal
12th Annual Polychar World Forum on Advanced Materials (POLYCHAR 12)
Prof. Antonio M. Cunha, Department of Polymer Engineering, University of Minho, P-4800-058 Guimaraes, Portugal, Fax: +351 253510339, E-mail: amcunha@dep.uminho.pt

26–31 January 2004 • Biodiversity and Natural Products • Delhi, India
International Conference on Biodiversity and Natural Products: Chemistry and Medical Applications (combining ICOB-4 and ISCNP-24)
Prof. V. S. Parmar, Department of Chemistry, University of Delhi, Delhi 110 007, India, Tel.: +91 11 2766 6555, Fax: +91 11 2766 7206, E-mail: virparmar@yahoo.co.in

9–10 March 2004 • Heterocyclic Chemistry • Gainesville, Florida, USA
5th Florida Heterocyclic Conference
Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, PO Box 117200, Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

3–8 April 2004 • Macromolecules • Stellenbosch, South Africa
UNESCO Introductory Course (3–4 April) and 7th Annual UNESCO/IUPAC Conference on Macromolecules with Special Sessions on Polymers in Medicine, Nanotechnology and Degradation (5-8 April)
Prof. RD Sanderson, Unesco Associated Centre for Macromolecules & Materials, Institute for Polymer Science, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa, Tel: +27(21) 808-3172, Fax: +27(21) 808-4967, E-mail: rds@sun.ac.za

17–21 May 2004 • Mycotoxins and Phycotoxins • Bethesda, Maryland, USA
11th International Symposium on Mycotoxins and Phycotoxins (ISMP-11)
Dr. Douglas Park, Food and Drug Administration, CFSAN, 200 C Street, SW, Washington, DC 20204, USA, E-mail: dpark@cfsan.fda.gov

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

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

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

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

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

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

11–15 July 2004 • Polymer Biomaterials • Prague, Czech Republic
43rd PMM Microsymposium: Polymer Biomaterials: Biomimetic and Bioanalogous Systems
Drahomir Vyprachticky, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovskeho nam. 2, CZ-162 06 Praha 6, Czech Republic, Tel.: +420 2 204 03332, Fax: +420 2 367 981, E-mail: sympo@imc.cas.cz

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

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

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

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

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

Mark Your Calendar

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

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

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

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

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

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

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

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

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

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

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

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Feature Articles Wanted

CI readership of about 9000 includes IUPAC members and affiliates, and individual subscribers. While 3000 copies are distributed in the United States, the rest go around the world, including all the countries that are adhering organizations of IUPAC, e.g., Argentina, Brazil, Canada, Belgium, Norway, South Africa, India and New Zealand—just to cite a few among the more than 60 countries that receive *CI*.

Interested in writing a feature article, contact the editor, Fabienne Meyers, at <fabienne@iupac.org>.