From the Editor

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

www.iupac.org/publications/ci

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

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

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

Printed by:
Cadmus Professional Communications,
Easton, MD USA

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

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

ISSN 0193-6484

Due to some fortuitous coincidences, this issue of *CI* is focused on the role of chemistry in addressing the major challenges facing Africa. Some compelling perspectives are provided on how the continent's problems might be addressed by a concerned international community of chemists.

The issue starts with the reflections of our current past president, Piet Steyn, who reminds us of his own experience and the challenges of our changing world. From his home country of South Africa he considers what role IUPAC should play and what kind of rewards and challenges are faced by those involved in the business of the Union.

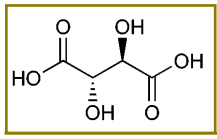
Next, a feature on page 8 addresses the "food question." Written by Ikenna Onyido, the article reports on the progress and development of CHEMRAWN XII, which will explore how to use chemistry to increase sustainable agriculture and human well-being. While CHEMRAWN XII will focus primarily on Sub-Saharan Africa, the "food question" constitutes a worldwide challenge. An important background paper on the subject was presented by Gbolagade Ayoola at a workshop held last August in Arusha, Tanzania, after the 9th Chemistry Conference in Africa. That paper, as Onyido describes it, is stimulating, very informative, and well researched. Ayoola discusses the roots of the food security problem and provides a framework for the proactive engagement of the scientific community. *CI* readers are encouraged to look behind these printed pages and review the CHEMRAWN project online. In order for the conference to tackle these pressing issues, support is needed from stakeholders and donor agencies. Interested parties should contact Professor Ikenna Onyido, chairman of the conference steering committee.

In the recently initiated series on emerging issues in developing countries, Nelson Torto discusses, from Botswana, the challenges of practicing analytical chemistry in Sub-Saharan Africa (see page 11). His pragmatic vision comes across with enthusiasm. He too welcomes your comments.

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

Contents

CHEMISTRY International May-June 2005 Volume 27 No. 3



Affiliate Members will find enclosed with this issue their certificate and card for 2005–2006. See www.iupac.org/affiliates for more information.

Looking Back and Pondering the Future

by Piet Steyn

IUPAC has played, and is destined to continually play, a vitally important role in advancing the "worldwide role of chemistry for the benefit of mankind." As an international non-governmental organization of member countries, IUPAC focuses on the needs of both the developed and the developing world. At this stage of my IUPAC career, the time is apposite to be reflective on the role of IUPAC in developing countries, such as my home country of South Africa, and to revisit my personal involvement in IUPAC, which always brought me great joy and satisfaction.

Within IUPAC, we should always strive to contribute to attaining the six long-range goals of the Union. I fully subscribe to the pursuit of these lofty goals:

- provide leadership as a worldwide scientific organization that objectively addresses global issues involving the chemical sciences
- facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion
- assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life
- foster communication among individual chemists and scientific organizations, with special emphasis on the needs of chemists in developing countries
- utilize its global perspective and network to contribute to the enhancement of chemistry education, the career development of young chemical scientists, and the public appreciation of chemistry
- broaden its national membership base and seek the maximum feasible diversity in membership of IUPAC bodies in terms of geography, gender, and age

As far as I can remember, the first IUPAC-sponsored symposium in South Africa, broadly directed at industry and the environment, was held in 1969 at the University of the Witwatersrand in Johannesburg. This event presented to many young South Africans, including myself, the first opportunity to participate in a truly international chemistry symposium in our country. During the period of isolation in South Africa, IUPAC sponsored a number of top-quality meetings and ensured invaluable links to the international world of science. In August 1982, I was intimately involved in the organization of the 13th IUPAC Symposium on the Chemistry of Natural Products, Pretoria. In July 1985, I acted as organizing chairman of the 6th IUPAC International Symposium on Mycotoxins and Phycotoxins, held in Pretoria. In 1996, I also organized a one-day IUPAC symposium titled "A Sustainable Environment—National and International Perspectives."

Over the years, IUPAC contributed extensively to polymer sciences in Africa by co-sponsoring workshops on this subject at the UNESCO Centre of Polymer Science at Stellenbosch University. In fact, 12 South African chemists served the international scientific world by their membership on IUPAC Divisions and various committees, including CHEMRAWN, Chemistry Education, and Chemistry and Industry. Currently, James Bull of Cape Town University serves as scientific editor of *Pure and Applied Chemistry*, the flagship journal of the Union. Three more scientists are currently involved in IUPAC projects, and 16 are IUPAC fellows.

Scientists from South Africa and from a number of other countries benefited from IUPAC's strong stand on the ICSU principle of the free circulation of all *bona fide* scientists. IUPAC sponsorship of scientific meetings always guarantees scientific quality, merit, and excellence. It is therefore not surprising that South African chemists, who longed to be part of the international world of science and learning, initially joined IUPAC in its Affiliate Membership Program. In addition to the 30 or so Members and Fellows, South Africa also counts 50 IUPAC Affiliates. To be an Affiliate is a good way to learn gradually about IUPAC and stay acquainted with the Union's activities. I would like to make a plea to readers of *Chemistry International* to share with your colleagues your experiences with IUPAC and motivate them to become affiliates.

As a South African, I am deeply committed to the science-based technological development of the African continent, a continent rich in human potential and natural resources. However, it is disconcerting

that only two countries from Africa—South Africa and Egypt—retain full membership in the Union despite several concerted efforts to lobby support for increasing membership in the Union. The value of research at universities and at research institutes in Africa is currently receiving the attention of highly influential international bodies. Perhaps the year 2005 could witness the dawn of a new era of science and technology for Africa.

While IUPAC is an organization whose formal members are chemical societies or academies, it is nevertheless "all about people." Top chemists worldwide contribute to IUPAC on a voluntary basis toward the worldwide advancement of chemistry. Since 1973, as a young chemist from a developing country, until the present, I have had the wonderful opportunity of interacting with the IUPAC leadership, particularly in more recent years very closely with Presidents Bard, Zamaraev, Fischli, Jortner, and Hayes. It was equally satisfying to collaborate with Secretary Generals Guy Ourisson, Tom West, Gerrit den Boef, and Ted Becker.

It is disconcerting that only two countries from Africa—South Africa and Egypt—retain full membership in the Union despite several concerted efforts . . .

I was elected in 1973 during the Munich (Germany) General Assembly as an associate member of the Food Contaminants Commission of what was then the Applied Chemistry Division. I contributed to the chemistry of mycotoxins—toxic substances produced by fungi—and in subsequent years actively participated in the many IUPAC-sponsored mycotoxin symposiums.

In subsequent years I was elected vice-president and president (1991–1995) of the Applied Chemistry Division and played a key role, under the leadership of Albert Fischli, in its reconfiguration into the successful Chemistry and the Environment Division.

At the General Assembly in 1999, I was elected IUPAC president; serving as vice president (president elect) in 2000–2001 and president in 2002–2003. Now, as direct past president, I also serve on the Scientific Advisory Committee of the 40th IUPAC Congress: Innovation in Chemistry, which will take place in Beijing in August 2005. As planned, the Congress stands to contribute significantly to the science-based development of China and the Far Eastern countries. IUPAC is dedicated to ensuring the success of the Congress in Beijing, and I make now a second plea to readers to actively participate in this high-profile scientific event.

A distinct highlight of my IUPAC career was working as a member of the Strategy Development and Implementation Committee under the inspirational leadership of Joshua Jortner and Ted Becker. The team effort led to the transformation of IUPAC from an old-fashioned commission-driven organization to a vibrant modern project-driven organization. It was most gratifying to learn at the Bureau meeting in Slovenia in October 2004 that the project system is, in fact, working well.

Many good things developed over the last few years. I have already alluded to the IUPAC vision statement and the defining of our six long-term goals. In addition, more recently, the Governance Structure Committee was established under the leadership of Leiv Sydnes, my highly valued colleague and the current IUPAC president. To alleviate financial market fluctuations and ease our national membership dues, mechanisms were developed, with the help of the Finance Committee and the Treasurer Christoph Buxtorf, to enable the billing of national subscriptions in national currencies. In addition, IUPAC received much credit for its professional advice to the Organization for the Prohibition of Chemical Weapons on the impact of scientific advances of the Chemical Weapons Convention.

In December 2003, as IUPAC president, I participated in a conference devoted to research and education in the Middle East. The meeting succeeded in attracting top-level chemists from the Middle Eastern countries and undoubtedly led to a better understanding among the scientists living in that part of the world.

A conspicuous point in IUPAC's environmental activities was, beyond a doubt, the SCOPE/IUPAC Symposium on Endocrine Active Substances held in Yokohama, Japan, in November 2002. The papers emanating from the workshop filled a record edition of *Pure and Applied Chemistry*. I wish to pay special homage to our dear colleague Junshi Miyamoto, who as president of the Chemistry and the Environment Division, inspired this scientific triumph. In April 2003, while the outcome of this project was being finalized,

continued on page 7

Joseph Priestley: Radical Thinker

Chemical Heritage Foundation's Exhibit on Joseph Priestley Includes Rare Instruments and Papers

by Mary Ellen Bowden

Visiting Philadelphia before the end of July 2005? The Chemical Heritage Foundation is holding an exhibit, *Joseph Priestley, Radical Thinker*, that chemists should not miss.

Although Joseph Priestley (1733–1804) is best remembered for his contributions to chemistry, his many pursuits included theology, politics, education, and several areas of scientific inquiry. At the entrance to the exhibit, an air pump (on loan from the Franklin Institute) that belonged to Priestley when he lived in Northumberland, Pennsylvania, from 1794 to 1804, serves as a reminder of his fame as a natural philosopher. But nearby representations of a dozen or so of Priestley's friends and foes give the visitor an early indication of Priestley's importance in eighteenth-century politics and religion as well.

A portrait of Antoine-Laurent Lavoisier, one of the two other contenders for title of "discoverer" of oxygen, is mounted on a wall near images and items related to members of the Lunar Society of Birmingham and founders of the Industrial Revolution. Their ranks include Matthew Boulton and James Watt as well as Josiah Wedgwood, who is represented by his famous jasperware plaques and a commemorative plate.

A portrait of King George III's prime minister, William Pitt the Younger, is included because he was one of Priestley's most resolute political foes. In one display case, Priestley's *Experiments and Observations on Different Kinds of Air*, volume I (1774), open to its dedication page, acknowledges the patronage from 1773 to 1780 of another politician, William Petty, Earl of Shelburne. Great political thinkers were among Priestley's sparring partners, including Edmund Burke and Thomas Paine, who, as different as their theories were from each other, were once Priestley's admirers but eventually became his foes. Jeremy Bentham, another political theorist, once wrote that he owed to Priestley the famous phrase "the greatest happiness of the greatest number."

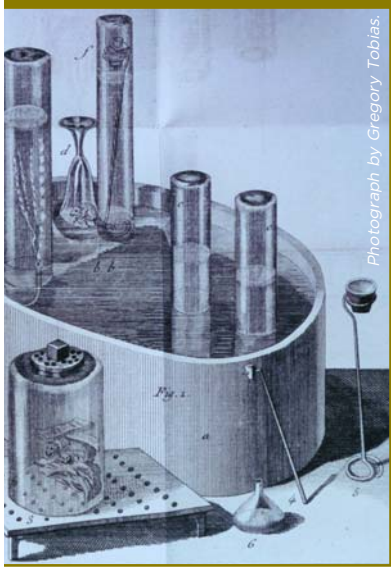
Priestley's fame and influence in America preceded his arrival there by decades. He maintained personal friendships with both Benjamin Franklin and John Adams from the days when those men were American diplomats in London (though his relationship with Adams soured over time). Priestley's writings on religion, politics, education, and natural philosophy were well known to many more Americans, including Thomas Jefferson and various ministers leaning towards Unitarianism, as well as those religious leaders who were scandalized by doubts raised by Priestley concerning the divinity of Jesus.

In the main exhibit area beckon the brass and glass of Priestley's career as a natural philosopher. On loan from Dickinson College, a reflecting telescope, microscope, surveyor's compass, and voltaic pile (thought to be a gift from Alessandro Volta to Priestley) immediately alert the viewer that Priestley thoroughly pursued several sciences other than chemistry. His *History and Present State of Electricity* (1767), inspired by Benjamin Franklin, was Priestley's first book in the sciences.

The exhibit's most eye-catching apparatus is the Smithsonian Institution's reproduction of one of Priestley's burning glasses, used to focus sunlight through lenses as a relatively clean way of heating substances to high temperatures. Magnificent original glassware (also from the Smithsonian) from Priestley's Northumberland laboratory shines in a nearby exhibit cabinet. After his arrival in Northumberland—a 130-mile wagon ride over bumpy roads from Philadelphia—Priestley continued to obtain the bulk of his glassware from England. The pneumatic trough that is most emblematic of Priestley's research on "airs" (gases) is

Photograph by Douglas Lockart.

The exhibition entrance at the Chemical Heritage Foundation.



Engraving from **Expériences et Observations sur differentes espèces d'Air***; Roy G. Neville Historical Chemical Library; Chemical Heritage Foundation.*

depicted in blown-up illustrations from *Experiments and Observations on Different Kinds of Air.*

Modern chemists might be interested to follow the details of how Priestley originally discovered oxygen, which did not actually take place on the oft-cited date of 1 August 1774. On that date he thought he had produced "phlogisticated nitrous air" (N_2O) from mercury calx (MgO) heated in a vessel set in a trough of mercury, since a lighted candle flared in the air so produced. It was in March 1775—months after his return from France, where he had mentioned this experiment to Lavoisier—that Priestley resumed his experimentation with mercury calx. This time, he carried out a succession of tests on the air produced. He observed that when he conducted his "nitrous air" (NO) test for the "goodness" of "common" or atmospheric air (the red fumes generated [NO_2] indicated in reality the presence of oxygen), a candle would burn or a mouse could breathe in the remains of a sample of this air. Reiteration of the tests led him to the conclusion that he had produced an air five times better than atmospheric air. He named this new substance "dephlogisticated air."

The exhibit attempts to give a sympathetic account of the appeal of "phlogiston" to Priestley, Scheele, Lavoisier (initially), and virtually all their chemical contemporaries. As a substance that could be transferred from one compound to another and dramatically changed the properties of the substances to which it united, phlogiston explained a number of important reactions. Despite Priestley's frequently proclaimed distrust of the role of theories in natural philosophy and his declared willingness to give up the theory of phlogiston should it be disproved, he clung to it until his dying day. Contributing to that obstinacy may well have been his astuteness as an observer. Repeatedly he produced results that Lavoisier and other oxygen chemists could not explain—disregarding the fact that oxygen explanations seemed to work pretty well on the whole, if not in every circumstance.

"Yours is one of the few lives precious to mankind, and for the continuance of which every thinking man is solicitous . . ."

Thomas Jefferson to Joseph Priestley, 21 March 1801

Two items in the exhibit bracket Priestley's long fight with the oxygen chemists. One is a manuscript copy of Priestley's "Experiments Relating to Phlogiston and the Conversion of Water into Air" (read before the Royal Society in 1783), in which Priestley responded formally for the first time to Lavoisier's attacks on phlogiston. The first presentation of Priestley's research to the American Philosophical Society was a reading by Samuel Vaughan in 1784 of this manuscript. An inscribed copy of Priestley's final chemical work, *The Doctrine of Phlogiston Established*, and that of the *Composition of Water Refuted* (Northumberland, 1800), demonstrates poignantly that Priestley never gave up.

The exhibit also delves into Priestley's religion and politics. As a Dissenter, he vigorously argued in books, pamphlets, and sermons that established churches, such as the Church of England, had corrupted Christianity, that all people should enjoy religious freedom, and that the ideals of both the American and French revolutions should be applauded. As a consequence of these views, Priestley was made public enemy number one by political and religious leaders in Birmingham, where he served as minister of New Meeting from 1780 to 1791. Forewarned of possible violence, Priestley did not attend a dinner held 14 July 1791 to commemorate the second anniversary of the storming of the Bastille. Disappointed at

Double-lens burning glass replica. Image courtesy of the Smithsonian Institution, National Museum of American History, Behring Center.

not finding Priestley among the diners, the rioters set fire to New Meeting, Priestley's home and laboratory, and a score of other buildings belonging to other Birmingham Dissenters.

This stretch of the exhibit is particularly enriched by a dozen eighteenth-century political cartoons given some years ago to the Chemical Heritage Foundation by Derek Davenport, professor emeritus of chemistry at Purdue University. In one cartoon, Priestley—with characteristic pointy nose and curly wig—breathes fire from a pulpit occupied by three Unitarian ministers. In another, he leads a toast with a chalice and calls for King George's head to be placed on the empty Communion plate that he bears. In still another, he consoles the king, who is about to be beheaded, that by his execution he is doing a great service to the nation.

Like today's political buttons, here, too, are medals lent by Roy Olofson, professor emeritus of chemistry at Pennsylvania State University. Commissioned by friends and foes, these medals show Priestley as a scion of democratic ideals or a threat to public safety.

Lent by the Pennsylvania Historical and Museum Commission, the lock and key salvaged from Priestley's house in Birmingham is a remarkable relic symbolizing the strife of this period in Priestley's life. So, too, is Priestley's letter of resignation to his Birmingham congregation, written from London, where he and his family fled immediately after the riots. He believed that his return to Birmingham could only bring further harm to his friends. This is the author-retained copy now held by the American Philosophical Society.

In 1794, under threat of arrest, Priestley and his wife moved to the United States to join their three sons, who were planning to set up a utopian society in central Pennsylvania. Although the utopia did not materialize, the family settled there, and Priestley made very occasional trips to Philadelphia. Even in the United States he proved to be a controversial figure. In Philadelphia, only the Universalists—who like the Unitarians believed in universal salvation—permitted him to preach from their pulpit. His preaching was so effective that it inspired the founding in 1796 of the First Unitarian Church in Philadelphia. Off in the hinterlands of Pennsylvania, Priestley's supposed sympathies with efforts to entangle the United States in an alliance with France against Britain almost landed him in prison under the terms of the Alien and Sedition Acts of 1798.

The exhibit also includes a corner with some of the textbooks written by Priestley. He spent many years as a teacher and educational adviser, usually combining such activities with preaching. Perhaps the most radical aspect of his pedagogy was his insistence that the study of modern history be part of the curriculum intended for young men preparing to become merchants or members of the gentry or for young women preparing to be their wives. In the United States, Priestley continued to enjoy a reputation as a great educator. The trustees of the University of Pennsylvania elected him professor of chemistry, a position that he declined. Among other signs of this veneration, Jefferson turned to him for advice in founding the University of Virginia.

Dr. Priestley's House and Laboratory, Fair Hill. ***Hulmondel after painting by Exted, lithograph; courtesy of the Archives and special collections, Dickinson College, Carlisle, PA; photograph by Gregary Tobias.***

The exhibit concludes with reflections on the Priestley heritage, including a proof for the American Chemical Society's Priestley Medal. For browsing, there is an eight-foot shelf of books about Priestley, including the recently published second volume of Robert Schofield's magnum opus, T*he Enlightened Joseph Priestley: A Study of His Life and Work from 1773 to 1804* (Pennsylvania State University Press, 2004).

Acknowledgement

Joseph Priestley, Radical Thinker is generously sponsored by the Lounsbery Foundation. CHF has contributed texts, images, and objects from its own

The Chemical Heritage Foundation's Exhibit

collections, including the Roy G. Neville Historical Chemical Library and the Derek Davenport Collection, and gratefully acknowledges the loan of objects from the following people and institutions: Archives and Special Collections, Dickinson College, The American Philosophical Society, Edgar Fahs Smith Collection, University of Pennsylvania Library, Franklin Institute Science Museum, Joseph Priestley House, Pennsylvania Historical and Museum Commission, The Library Company of Philadelphia, Roy A. Olofson, Robert E. Schofield, Smithsonian Institution, National Museum of American History, Behring Center, Special Collections Library, The Pennsylvania State University Libraries.

Photo by Will Brown

Dumourier Dining in State at St. James, on the 15th of May, 1793. ***James Gillray (British, 1757–1815), hand-colored etching. Derek A. Davenport Collection, CHF.***

The exhibit is open to the public weekdays between 10 a.m. and 4 p.m. at the Chemical Heritage Foundation, 315 Chestnut Street, Philadelphia, Pennsylvania. For more information or to arrange group visits or guided tours, please e-mail <josephpriestley@chemheritage.org> or call 215-925-2222.

Mary Ellen Bowden is senior research historian at the Chemical Heritage Foundation in Philadelphia, Pennsylvania.

www.chemheritage.org

Past President's Column

continued from page 3

Junshi Miyamoto passed away unexpectedly after a short illness.

Also during my presidency, the naming of element 110, darmstadtium, took place during the Council meeting in Ottawa. I am delighted that much progress has been made on this important front and that element 111 was finally named roentgenium this past November 2004.

Now in its sixth year, it is gratifying to continue receiving excellent essays from young researchers applying for the IUPAC Prize for Young Chemists. The 60 applications from 22 countries entered for the 2005 award are currently being evaluated and it is expected that the prize winners for this year will be announced shortly. It will be a privilege to meet and reward these young chemists in a ceremony held at the coming Congress in Beijing in August.

The Future

IUPAC as a scientific Union is fortunate to have a close relationship to the chemical industry. However, we are also exposed daily to the rapidly changing world. It is most disconcerting, for instance, to learn about the closure of a chemistry department at a well-established university. I believe the future lies in attracting the brightest young minds to the chemical sciences and by involving them in challenging multidisciplinary research programs. Recent IUPAC-sponsored meetings already point the way, as evident from the topics of these meetings: bio-informatics, electronically active polymers, high-temperature materials, biophysical complexity, plasma chemistry, and spectroscopy and macromolecular systems. I am sure that these topics and the challenges of nanotechnology and its applications will satisfy the brightest of young chemists. Indeed, the future is not what it used to be.

Pieter S. Steyn <psst@sun.ac.za> is the IUPAC past president and chairman of the committee adjudicating the Prize for Young Chemists. He has been involved with the Union since 1973 and is currently senior director of Research Development at Stellenbosch University in South Africa.

Exploring Solutions to Africa's Food Crisis

by Ikenna Onyido

Solving Africa's hunger crisis, in which at least 38 million people in Sub-Saharan Africa are suffering exceptional food shortages, clearly will require a multitude of political, economic, and scientific efforts. One promising project—spearheaded by IUPAC's CHEMRAWN Committee—is trying to boost sustainable agriculture in Africa through chemistry. The main focus of the project is organizing the CHEMRAWN XII Conference on Chemistry, Sustainable Agriculture, and Human Well Being in Sub-Saharan Africa, which will most likely be held in 2007. Although details of the conference are being worked out, a foundation of enthusiastic support has developed across the African continent since a preliminary workshop was held 7 August 2004 in Arusha, Tanzania.

On behalf of the CHEMRAWN Committee, a one-day workshop was convened as part of the program of the International Chemistry Conference in Africa, which took place 2–7 August 2004 at the Arusha International Conference Center. The 34 participants who attended the workshop were drawn from 12 African countries as well as Sweden, the United Kingdom, the Netherlands, and Bangladesh.

What is CHEMRAWN?

The CHEMRAWN Committee is a standing Committee of IUPAC. The acronym CHEMRAWN stands for Chemical Research Applied to World Needs. The committee has organized a number of important conferences that have dealt with specific problems of global concern or with global implications, bringing together scientists, government leaders and policy makers, the private sector, donor agencies, and non-governmental agencies to examine the problems and come up with actionable recommendations. Concrete follow-up actions and programs are evolved in these conferences and these are supervised, managed, and implemented by each conference's Future Action Committee (March-April 2003 *CI*, p. 6).

www.iupac.org/standing/chemrawn.html

The workshop galvanized "grassroots" support for CHEMRAWN XII by elucidating how the vast array of analytical and problem-solving tools of the chemical sciences can contribute to the quest for food security in sub-Saharan Africa. Participants were unanimous in welcoming the objectives of CHEMRAWN XII as comprehensive, insightful, and adequate for driving a productive dialogue on ways to promote sustainable agriculture with substantial contributions from chemistry and chemists. Participants also agreed that it would be more meaningful for CHEMRAWN XII to be held in a country where the problems to be discussed during the conference really exist in tangible forms, such as Ethiopia, Tanzania, Kenya, or Angola.

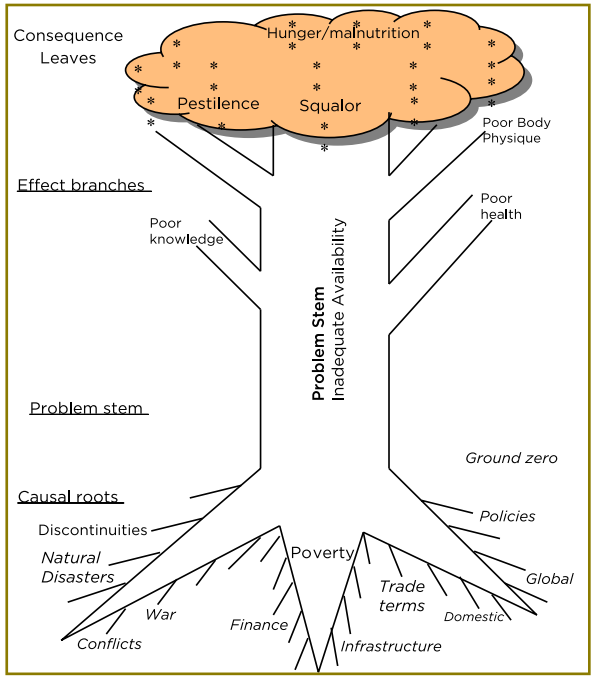
The focal point of the conference was a background paper, titled *The Food Question in Sub-Saharan Africa and the Challenge of Scientific Agriculture*, delivered by Professor Gbolagade B. Ayoola, an agricultural economist from the University of Agriculture, Makurdi, Nigeria. Ayoola is presently Policy Economist to the International Fertilizer Development Center (IFDC)—Marketing Inputs Regionally (MIR) project. The paper gave an overview of the nature and dimensions of the *food question* and identified the role of scientific agriculture in addressing the food problem in sub-Saharan Africa. The paper so nicely framed the issues that participants suggested it be incorporated into the documentation used to raise funds and support for the conference. Following are some highlights:

- Background to the Food Question—Using a hypothetical food problem tree, Ayoola identifies the root causes of the food problem in the region as (i) poverty, (ii) aberrant and conflicting policies by national and global bodies, and (iii) socio-economic discontinuities. The stem of the hypothetical tree represents the main axis of the food problem which consists of (i) inadequate availability of food and (ii) lack of access to available food. The cumulative effects of these are the evident symptoms of the food problem, such as starvation, pestilence, and squalor.
- Some African Perspectives—According to Ayoola, some of the major causes of the grim food security situation are subsistence food production by resource- and infrastructure-poor farmers who are unable to adopt proven technologies; focus on exportable cash crops at the expense of sustainable farming; weak relationship between agricul-

ture and industry; limited access to food due to poverty; and widespread incidence of HIV/AIDS, which limits the number of laborers available for agriculture.

- The Challenge of Scientific Agriculture—Ayoola states that the long-term objective of food security can only be attained by attacking the issues at the root of the problem, using the two main action pillars of technology advancement and market development, wherein the challenges of scientific agriculture can be located. He identifies a number of areas that hold promise for scientific agriculture: genetic engineering and bio-control, process technology and management (fertilizers, pesticides, etc.), and product technology (post-harvest preservation, processing, storage, etc.).
- The IFDC Model—Ayoola argues that steady scientific intervention together with integration of markets or regional circumstances is superior to ad hoc food aid as a mode for addressing the food question.

The paper is well researched and very informative. It not only forms a basis for discussion, but also will stimulate chemists to address issues of sustainable agriculture in sub Saharan African.



Hypothetical Food Problem Tree. Excerpted from "The Food Question in Sub-Saharan Africa and the Challenge of Scientific Agriculture," by G. Ayoola. This paper is available online at www.iupac.org/publications/ci/2005/2703/2_crXII.html.

Workshop Objectives

- articulate the issues that concern chemistry and chemists in the drive for sustainable agriculture in sub-Saharan Africa as well as collate views on the way forward
- gather information on existing or planned projects and conferences on food and nutrition in Africa and seek ways to ensure that CHEMRAWN XII acts in concert and cooperation with such efforts
- brainstorm on how to galvanize professional, financial, and political support in Africa and beyond for the project
- enlist the interest, support, and participation of top African chemists in the project

The second half of the workshop was devoted to a free discussion among the participants on the following question: "In What Ways Can Chemistry Contribute to Food Security and Sustainable Agriculture?" Following is a summary of the contributions from participants.

Professor Saka of Malawi suggested that chemistry and chemists can help improve crop/livestock production and utilization in the following ways:

- carry out soil fertility studies that will lead to formulation of fertilizers for different soil types and the utilization of organic matter and wastes for the production of fertilizers
- develop more effective disease and pest control management, including biopesticides for crops/livestock and stored products
- research better post-harvest handling methods and food fortification
- exploit non-traditional plants for indigenous fruits and vegetables

According to Professor Bukuru of Burundi, there is a woeful lack of interface between governments in Africa and scientists, especially chemists, which means that decisions regarding the food problem are not informed by sound science. So even though there are many chemists in Africa engaged in research on various themes relating to the food problem, the results of their research are often not brought to the attention of the decision/policy makers. Therefore, Bukuru suggested, the various African chemical societies should collect all relevant research regarding sustainable agriculture and summarize and disseminate it to relevant authorities. In general, he stated, avenues should

be explored to bring chemists and decision/policy makers together, to act cooperatively in matters relating to enhancing food production and availability.

Professor Jondiko of Kenya suggested the following areas in which chemists could help increase food production:

- production of fertilizers and pesticides from natural sources
- efficient use of water and reduction of transpiration rates of crop plants
- chemically induced germination of seeds
- food conservation technologies that are chemistry based
- agri-waste processing (e.g., rice and wheat husks, maize storers, fruit peels, etc.) to produce raw materials for animal feed and fertilizer industries

Dr. Keriko of Kenya provided a compelling example of how chemists can help develop sustainable agriculture. He discussed how the Jomo Kenyatta University is helping to rehabilitate the yellow oleander plant (*Theveta peruviana*), a drought resistant plant used for seed oil production in poor, dry areas of Kenya. The plant is traditionally used as a hedge, for the provision of shade and generally as an ornamental plant. According to Keriko, the plant has a hard seed whose inner kernel, which is 30% of the seed, contains 61% oil. Analysis of the oil reveals a fatty acid composition that is similar to the oil commonly used in the manufacture of soaps and detergents. Keriko said that the project is utilizing the oil in the manufacture of soap and cosmetics and is exploring its use as bio-diesel for diesel engines; as well as investigating its edibility.

Professor Bashir of Sudan emphasized the importance of establishing sustainable agricultural practices that are based on what is available to the farmer. For example, he said, much of agriculture in sub-Saharan Africa is rain-fed and the yields of crops are low, especially in areas with low volumes and short periods of rainfall. While there is the need to move into the culture and practice of irrigated agriculture, he noted that chemists can do the following things to assist the farmer:

- conduct studies on soils and mechanisms for the release of bound phosphate through the addition of indigenous materials such as organic matter
- investigate how to use natural products as pesticides, fertilizers, and food preservatives.
- formulate fertilizers that are consistent with the different requirements of the various soil types
- improve the animal feed industry through research into alternatives to concentrates and vitamins
- develop a biotechnological approach to breeding for resistance to diseases and drought

Objectives of CHEMRAWN XII

CHEMRAWN XII is intended to focus attention on the food situation in sub-Saharan Africa and explore ways for chemistry to help make a difference. The objectives of CHEMRAWN XII are summarized as follows:

- highlight the roles of chemistry in agriculture and recent advances in the chemical aspects of soil fertility and management, pest management, post-harvest technology, biotechnology, and high-value agricultural products
- identify constraints to scientific sustainable agriculture in the region in the areas of policy and knowledge gaps
- provide examples of successful research in chemistry that are relevant to agriculture.
- develop strategies for transfer and adaptation of low-cost technologies that have worked elsewhere
- promote other strategic issues relevant to the quest for sustainable agriculture (e.g., private-sector participation, training and involvement of young African chemists in agriculture related research, gender issues, etc.)

One way that chemistry can help address the food question in Africa, stated Professor Åkerblom of Sweden, is to encourage the use of what is available. In this regard, she said, food preservation is very important. The food chemist can engage in research on how to improve the nutritional value of the foods that are available. Simple methodologies that result from such research can then be disseminated.

Participants commended the CHEMRAWN Committee for this laudable initiative. They urged that no efforts should be spared in organizing the conference because of its inherent potential as a platform for concerted action by chemists to help transform agriculture and increase food production and availability in sub-Saharan Africa.

Ikenna Onyido <ikennaonyido@yahoo.com>, is professor of chemistry and Director of the Center for Agrochemical Technology at the University of Agriculture, in Makurdi, Nigeria. He is chairman of the CHEMRAWN XII project.

www.iupac.org/projects/2001/2001-086-1-021.html

Emerging Issues in Developing Countries

This series, coordinated by Jan-Åke Jönsson, seeks to inform readers, explore new ideas, and promote discussion on themes related to developing countries and emerging analytical communities. The first article in this series, "How Can IUPAC Facilitate International Collaborative Research?" was published in the March-April 2005 CI*. If you wish to contribute to this series, please contact <jan_ake.jonsson@analykem.lu.se>.*

Challenges of Practicing Analytical Chemistry in Sub-Saharan Africa

by Nelson Torto

Practicing analytical chemistry can be rewarding and challenging as it impacts on agriculture, health, and the environment. Therefore, analytical chemistry is an important tool for helping people living in poverty. For example, analytical chemistry can reveal harmful pathogens or substances in air and drinking water that are making people sick.

It is generally the research needs of the developed world that dictate the pace and direction of analytical chemistry research. Thus, because of the huge gap between the developed and the developing world in the ability to harness technology, analytical chemistry needs and demands are different in the two worlds.

The challenge for analytical chemists working in Sub-Saharan Africa is to maintain a role in their own country, and also to keep in pace with, and establish a profile amongst international colleagues. To achieve this aim they have to publish in international journals with a high impact factor, and attend key conferences where their research findings can be presented. The problems presented by such a situation are twofold. For chemists from developing countries, the cutting-edge research necessary for recognition might have no relevance to the critical research, such as developing life-saving medicine, that is a priority in their home countries. This occurs because either there is no parallel thinking amongst administrators to adopt the findings or simply no capacity to institute the new technologies. Secondly, the research findings published in international journals might be inaccessible to colleagues within the region where similar experiences need to be shared.

The obvious problem is that there is no mechanism for disseminating analytical chemistry findings that might help disadvantaged populations, but might not necessarily be cutting edge. It is likely that two neighboring scientists might never be able to share their findings simply because of poor access to international publications. Through IUPAC it might be possible to explore a mechanism by which regionally important research findings can be reviewed, evaluated, and published, thus ensuring widespread access.

In a recent IUPAC-sponsored conference organized by the Southern and Eastern Africa Network of Analytical Chemists (SEANAC), it was very clear that most analytical chemists in Africa were working on various aspects of metal and pesticide analysis. These might not necessarily be hot research topics, but the emphasis on these fields would indicate that there is a need to evaluate and document these research findings for the better good of those who are still concerned about such issues.

Connectivity is another major problem that is faced by many scientists. Many institutions, almost 15 years after the introduction of reliable and fast connectivity through the Internet, are still struggling to maintain reliable e-mail and Internet service. There are very few countries in Africa that have institutions with a robust e-mail system. It is not uncommon for an institution to be cut-off from the rest of the world for several weeks. The limitations imposed by poor connectivity can make it hard to be a reputable scientist. For example, scientists may be unable to receive weekly alerts from journals, to communicate with other scientists, and to respond in a timely fashion to communications from journal editors.

There are other challenges that need to be noted, including the acquisition and maintenance of scientific instrumentation and locating reliable suppliers of chemicals. Because suppliers are mainly from the developed world, it is not always possible to get the service that would ensure maximizing the usage of instrumentation. Generally, service delivery is slow, and at times unpredictable. In order to address these limitations, the Network of Users of Scientific Equipment of Southern Africa (NUSESA), has been established as an initiative for scientific users to share experiences, spare parts, and instrumentation. Similarly, the Network for Analytical and Bioassay in Africa (NABSA) also provides free analytical services, mainly mass spectrometry and NMR analysis to scientists in Africa. These initiatives ensure that the research efforts of those who can't access advanced instrumentation are not restricted.

The acquisition of chemicals is a special problem for scientists who live in small countries that are also landlocked. Major suppliers have given rights to a few vendors through which all orders should be made. Although this might have been a good idea in the past, as it generally lowered the freight costs, with the advent of secure Internet connections and credit cards, it is not justifiable that the old system continues to operate. Such an arrangement is complicated by the recent events of September 11. Chemicals imported especially from the USA may require permits that are only issued for transport to one country without an allowance for further export to a landlocked country. A direct purchase by credit card could circumvent this problem, rather than the present vendor scenario.

A single solution for all these problems is not feasible. However SEANAC addresses these issues by collaborating with other networks such as NUSESA, NABSA, and the African Network for Analysis of Pesticides. This collaboration has resulted in workshops, conferences, and short visits that allow analytical chemists to share facilities, expertise, and experiences, and thus maximize resources. Most of what has been achieved to date is credited to the continued financial support through Sida/SAREC (the Swedish International Development Coopertion Agency, Department for Research Cooperation), either directly or through the International Programme in the Chemical Sciences at Uppsala University, Sweden. The Chemistry Department at the University of Botswana, because it is endowed with state-of-the-art facilities that include NMR (300 and 600 mHz), LC/GC-MS, SEM/TEM, XRD and ICP/MS, has generously assisted most of the networks by either hosting short courses or researchers. One hopes that as more universities and organizations become involved, including IUPAC, some of these issues might find a solution sooner so as to allow scientist to focus on addressing pressing matters in the agriculture, health, and environment sectors.

Nelson Torto <torton@mopipi.ub.bw> is a lecturer in general and analytical chemistry at the University of Botswana, with strong links to the University of Lund (Sweden) from which he obtained his Ph.D. His research interests are in the areas of sampling and sample handling for biological and environmental samples. Torto joined the IUPAC Analytical Chemistry Division (ACD) in 2004 as a provisional member. He has been actively involved in promoting analytical chemistry in Botswana and on the African continent in general. In addition, he played a leading role in the formation of the Southern and Eastern Africa network for Analytical Chemists, which held its inaugural conference in July 2003 in Gaborone (Botswana) (see *Teamwork*, the ACD newsletter <www.iupac.org/divisions/V/Teamwork>, issue No. 6, Nov 2003). He is working on the creation of channels for the promotion, education, and training of African scientists and standardized curriculum for analytical chemistry.

Simples and Compounds

In the Jan-Feb 2005 CI, *Claudio Giomini, Mario E. Cardinali, and Liberato Cardellini, put forth a rationale for replacing the term "element" with simple substance. They wrote, "To make a clear-cut distinction between elements and elementary substances, we suggest replacing the latter term with "simple substances," a term that, according to Scerri and Laing, was employed, with this meaning, by Mendeleev himself." The following letters were received in response.*

by Eric Scerri

I would like to express my agreement with Giomini, Cardinali, and Cardellini for drawing attention to the fact that substances like diatomic oxygen and electrolytic copper occur as simple substances.[1] However, two qualifications should be made. As the authors state, I have previously also made this point, and have invoked the name of Mendeleev for also having doing so.[2] Nevertheless, Mendeleev used a slightly different term, namely "simple body."

More importantly, the authors seem to deny the status of elementhood altogether to simple substances. This appears a little excessive given the entrenched use of the term "element" to mean a simple substance such as diatomic oxygen that can be isolated.

The notion of a simple body was first introduced by Lavoisier as a means of ridding chemistry from all talk of elements as the invisible principles of the ancient Greek philosophers and alchemists. This is how modern chemistry was born, by denying the metaphysical aspect of elements. But as many authors have pointed out, neither Lavoisier nor anyone else has quite succeeded in eradicating the more philosophical sense of the term element. Although we need to recognize the metaphysical foundations of chemistry, we cannot hope to deny substances like di-oxygen—that can be isolated—their status as "elements."

What the authors might consider doing is drawing on the dual sense of the term element. They could make a distinction between element as a simple substance and element as a basic substance, the latter of which they clearly allude to in their description of "element." This terminology was first proposed by the radiochemist Fritz Paneth who was in fact responsible for the term "simple substance" that the authors seem to have adopted.[3]

References

1. C. Giomini, M.E. Cardinali, L. Cardellini, *Chemistry International*, 2005 (1), 18.
2. E.R. Scerri, *Minds and Molecules*, N. Bhushan, S. Rosenfeld (eds.), New York, Oxford University Press, 2000, 51–72.
3. F.A. Paneth, *Foundations of Chemistry*, 2003, 5, 113–145. Reprinted from a translation of a lecture given in 1931.

Eric Scerri <scerri@chem.ucla.edu> teaches in the chemistry department at UCLA in Los Angeles, California, USA and is the editor of *Foundations of Chemistry*, <www.kluweronline.com/issn/1386-4238>.

by John E. Hammond

I believe the change suggested by Giomini et al (Jan-Feb 2005 *CI*, p.18) is not necessary. Chemists generally understand the difference between elements and elementary substances and use the term "element" as a shorthand descriptor. I do not know any chemist who would not understand that diamond, graphite, or fullerenes are all different forms of the element carbon—the common names take care of differentiation. Non-chemists are unlikely to understand the distinction and could become further confused by having "two types of elements."

John E. Hammond <JohnHammond@wrigley.com> is in the R&D Department of Wm. Wrigley Jr. Co. in Chicago, Illinois, USA.

No more "emf"

As a follow-up to Vladimir Simeon's question about replacing the term "electromotive force," published in the November-December 2004 *CI*, p.18, Christopher Brett, vice president of the Physical and Biophysical Chemistry Division, informed *CI* that the issue has been a concern of the former Commission on Electrochemistry since the publication of the 2nd edition of the "Green Book"* in 1993. As Simeon rightly pointed out, the name is inconsistent with its meaning and the word "force" is misleading, since potential differences are not forces.

Beginning in 1997, an extensive revision of the Electrochemistry section of the "Green Book" was carried out by the Commission on Electrochemistry. The revisions include the removal of "electromotive force" and "emf." In referring to an electrochemical cell, only the terms "cell potential" or "potential difference of an electrochemical cell" are recommended.

The 3rd edition of the "Green Book" in which the revised section on Electrochemistry will appear, is highly anticipated. The Green Book will clarify this and other issues and be an important aid and source of recommended terminology and symbols, both for electrochemists and for the wider chemical community.

* I. Mills, et al, *IUPAC Quantities, Units and Symbols in Physical Chemistry*, 2nd ed., Blackwell, Oxford 1993.

The IUPAC Poster Prize Program

With the recent advent of the IUPAC Poster Prizes program, National Adhering Organizations and eligible IUPAC-sponsored conferences gained a strategic tool to encourage interest in conferences among young chemists. The Poster Prizes recognize outstanding poster presentations at IUPAC Congresses, at IUPAC division/standing committee-sponsored conferences, and at designated national meetings. Each NAO may pick one conference per year at which to award IUPAC Poster Prizes.

As explained by the secretary general David StC. Black in his column in the January-February 2005 *CI* (p. 2), division or standing committee-sponsored, or so-called "core," conferences are specifically driven by IUPAC divisions and standing committee to the extent that they take responsibility for ensuring the continuity of a series. This usually means that the committee is involved in the selection of the organizers and the location of future conferences to ensure geographical diversity. The committee may also review the conference program, help select the plenary and invited lecturers, and assist with promotion efforts. With these guidelines in mind, divisions and standing committees benefit from the Poster Prizes program because it provides an extra incentive to maintain IUPAC's relationship with recognized conferences throughout the world. Conferences sponsored by IUPAC and national meetings of NAOs also benefit by being able to offer a prize that is associated with IUPAC, which often bolsters the participation in and credibility of a meeting.

The IUPAC Poster Prizes program was implemented in 2004 following a suggestion from President Leiv Sydnes. The Executive Committee officially approved the program at its meeting in April 2004. It was felt that implementing such a program would benefit IUPAC and provide incentives to younger chemists to attend conferences they might not otherwise attend. The program will also serve as a means for recognizing IUPAC's international activities.

Each eligible conference that chooses to implement the IUPAC Poster Prizes typically awards two prizes. The conference organizers oversee the selection of prizewinners. Each prize recipient receives a certificate signed by the IUPAC president, a copy of the IUPAC Gold Book (*Compendium of Chemical Terminology*), and a two-year subscription to *CI*.

In 2004, prizes were awarded at four international conferences and four national meetings, even though the program was only initiated in mid-July. The astute reader of *CI* might have noticed mentions of these poster prizes in recent issues. The 2004 recipients, all listed in the table below, are congratulated for their poster presentations.

2004 IUPAC Poster Prize Recipients

Solubility Phenomena—ISSP 2004—Aveiro, Portugal, 25-29 July 2004

Ada Villafafila Garcia (Technical University of Denmark, Lyngby), "Solid-Liquid-Vapour Equilibrium for Sparingly Soluble Salts Found in Natural Waters"

Mara G. Freire Martins (University of Aveiro), "Oxygen Solubility in Perflurocarbon Emulsions and Water Solubility in Pure Perflurocarbons"

Organic Synthesis—ICOS-15—Nagoya, Japan, 1-6 Aug. 2004

Natalie A. Miller (Australian National University), "Synthesis and Reactions of Substituted Dendralenes"

Toshifumi Dohi (Osaka University), "Preparation and Reactivity of Novel Recyclable Hypervalent Iodine(III) Reagents"

Eun Joo Kang (Seoul National University), "Synthesis of SCH 351448"

Chemical Education—ICCE 18—Istanbul, Turkey, 3-8 Aug. 2004

Maryam Dorri (Chemistry Group, Tabriz, Iran), "Green Chemistry, Green Culture"

Polymer Networks—Bethesda, MD, USA, 15-19 Aug. 2004

Ashish Batra (Cornell University), "Physical Gels of "Model" Polydimethylsiloxane Ionomers"

Samir A. Shah (Wake Forest University), "Quantification of Biopolymer Filament Structure"

Poland

Annual Meeting of the Polish Chemical Society, Wroclaw, Sept. 2004

W. Bury (Warsaw University of Technology), "Structure and Reactivity of Alkylzinc Carboxylates"

Roman Joachimiak (Nara Institute of Science and Technology), "Bile Acids: Fundamental Building Blocks for Artificial Ion Channels"

Dorota Samson-Lazinska (Instytut Farmaceutyczny), "Spectroskopic and Crystallographic Studies on Polymorphism of Imatinibe Mesylane"

South Africa

Chromatography—Mass Spectrometry 2004 Symposium, Pretoria, 17-20 Oct. 2004

Maria Fernandes-Whaley (University of Pretoria)

N. Nkosi (University of Pretoria)

Chemical Society located in Taipei, China

2004 Annual Meeting of the Chinese Chemical Society —Taipei, Chung-Hsing University, 19-21 Nov. 2004

Yi-Lung Yang (National Chi Nan University), "Synthesis, Photoluminescent, and Electrochemical Properties of Novel Triphenylamine-Containing Aromatic Polyamides and Polyimides"

Pakistan

15th National Chemistry Conference: Department of Chemistry, Quaid-I-Azam University, Islamabad, Pakistan, 24-26 Nov. 2004

Samina Nazir (Quaid-I-Azam University), "Synthesis and Biological Screening of Chalcones"

Asifa Nigar (Quaid-I-Azam University), "Synthesis and Characterization of Ferrocene Based Polyamides"

Iftikhar. A. Awan (University of Peshawar), "Kinetics and Mechanism for the Gas Phase Thermal Decomposition of some Halogenated Hydrocarbons"

It has been encouraging to see that NAOs and conference organizers appreciate IUPAC's efforts to stimulate outstanding poster presentations. Professor Mike Scurrell, who is organizing the 2005 Carman Symposium, hosted by the South African Chemical Institute, has responded warmly to this program. While informing the Secretariat that the conference will award IUPAC Poster Prizes on behalf of South Africa's NAO, he wrote:

> *"As a regular organizer of conferences we are well aware of the importance of awarding prizes for poster presentations, particularly for younger contributors. Over the past few years we have been astounded by the very significant increase in the quality of posters that are now a far cry from some of the hastily compiled sheets of research results that were very common in the past. The lure of a prize, be it a medal, cash, certificate, or similar really can focus the mind on producing a high-quality product and can ensure a high state of preparedness on the part of the presenter when the poster session is held, in order that some meaningful discussion and interaction can take place. We assess poster quality not only on the appearance of the item, which, with modern software can achieve a very impressive level, but also on the scientific content and the way the poster medium is used to convey the essential message quickly and accurately. We also acknowledge the ability of the presenter(s) to engage with those viewing the poster. In the specific case of IUPAC prizes, there is the additional benefit of helping us bring to everyone's attention the work of the organization by raising awareness of the Union at conference gatherings."*

So far in 2005, 11 NAOs have reported that IUPAC Poster Prizes will be awarded at a national event; these are listed in the table on the right.

Starting with this issue of *CI*, each IUPAC-sponsored conference eligible to award poster prizes will be flagged in the Mark Your Calendar section (page 37), as well as online. Over the most typical two to three-year cycle, no less than 27 "core" series will be eligible to award IUPAC poster prizes.

Details and guidelines can be found at <www.iupac.org/news/archives/2004/poster_prizes.html>.

2005 National Events at Which Poster Prizes Will Be Awarded

Australia
Connect 2005, Chemical Challenges for the 21st Century, Sydney, 3-7 July 2005
Austria
Austrian Chemical Society, University of Leoben, 19-22 Sept. 2005
Canada
88th Canadian Chemistry Conference, Saskatoon, Saskatchewan, 28 May – 1 June 2005
Denmark
Annual meeting of the Danish Chemical Society, Odense, 9 June 2005
Germany
Gesellschaft Deutscher Chemiker, "GDCh-Jahrestagung", Duesseldorf, 11-14 Sept. 2005
India
7th Chemical Research Society of India's (CRSI) National Symposium, Bombay, Feb. 2005, India
Korea
96th National Meeting of the Korean Chemical Society, Yonsei University, Wonju, 21-22 Oct. 2005
Pakistan
16th National Chemistry Conference: Pakistan at Bahauddin Zakaria University, Dec. 2005
Serbia and Montenegro
Annual meeting of the Serbian Chemical Society, Belgrade, 24-25 Jan. 2005
South Africa
Carman Symposium (South African Chemical Institute), Midrand, Johannesburg, 17-18 Nov. 2005
Spain
30th Biannual meeting of the Royal Society of Chemistry of Spain, Lugo, 19-23 Sept. 2005

Making an imPACt

As James Bull demonstrated in his recent feature article (March-April 2005 *CI*, p. 13), the Union Journal *Pure and Applied Chemistry*—of which he is scientific editor—is getting some attention these days. Not only are the contents of the journal garnering interest, but also its format and online availability. The year 2005 is seeing many changes in the journal production workflow, starting with the full implementation of the online submission and peer-review system (March-April 2005 *CI*, p. 24). Also, starting with the January issue, all metadata for the online edition are generated using a new procedure based on the extraction of information from the files produced for the printed edition. All HTML abstract pages have up-to-date format classification XHTML 1.0. The ability to harvest these data, coupled with further programming, now allow the journal to take part in CrossRef.

CrossRef is a collaborative, cross-publisher reference-linking service that turns citations into hyperlinks, allowing researchers to navigate online literature at the article level. CrossRef is a wholly independent association of scholarly and professional publishers—large and small, commercial and non-profit, traditional and non-traditional—that cooperate to provide reference links into and out of their electronic content. As such, CrossRef serves as the citation linking backbone for all scholarly literature online, facilitating and transforming the flow of information.

Each manuscript indexed with a unique DOI (Digital Object Identifier) can be retrieved more easily now. To try for yourself the basic DOI function, visit <www.crossref.org> and simply type the following example into DOI Resolver: 10.1351/pac200577010119. This shall take you directly to the following *PAC* abstract page: <www.iupac.org/publications/pac/2005/7701/7701x0119.html>.

As a small publisher with only one journal, IUPAC made the decision to participate in CrossRef recognizing the benefit of increased accessibility and visibility. Given *PAC's* limited resources, the practical implementation took some time, but the engagement and will of Bohumir Valter was instrumental to the entire transformation. His service to *PAC*, provided through Document Data Services, supplements the existing work performed by the production editor Cheryl Wuzbacher and Cheryl Bush.

As Bohumir Valter mentioned, a lot of work is still required to get *PAC* fully integrated with CrossRef, but step-by-step the modification of the journal workflow and the site will take place.

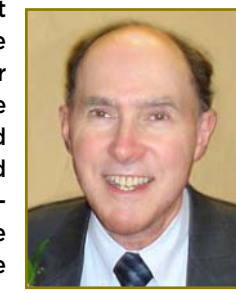
While IUPAC is making progress with improving the current production of *PAC*, one should also note the steady progress made posting older issues of *PAC* online. In mid-February, a milestone was reached with 25000 pages of *PAC* scanned.

Document Data Services started this project in fall 2003, following the recommendation of the Committee on Printed and Electronic Publication at its meeting during the 2003 General Assembly. The restoration process includes black and white scanning at 600 dpi and 300 dpi for pages with color and halftone figures, TIFF conversion to searchable PDF, indexation of the scanned article, and also rebinding of the original paper copies. To assure the quality of the archive, all digitalized pages are reviewed and manually retouched if needed. The resulting files are archived on CD and made available on the *PAC* Web site. The project will be completed in 2006.

www.iupac.org/publications/pac

Coplen Honored

Tyler B. Coplen has been granted the highest honor of the U.S. Department of the Interior, the Distinguished Service Award, for his outstanding contributions to the U.S. Geological Survey in the field of isotope geochemistry and hydrology. Dr. Coplen is an internationally recognized leader in the analysis of light stable isotopes. He



Look on the inside back cover for the General Assembly Schedule

is one of the worlds' most experienced analysts and foremost authorities on the stable isotope geochemistry of natural materials associated with the hydrologic cycle. He has built, operated, and continues to improve automated systems for mass spectrometers that drive the technology for such analyses. Technical experts around the world seek his advice.

Dr. Coplen produced a large body of work using stable isotope data that led to an improved understanding of the movement of both ground water and surface water. His work on isotope techniques has been instrumental in elucidating many physical, biological, and chemical processes that mediate water qualities and contribute to the solution of complex problems requiring interdisciplinary collaboration.

At IUPAC, Coplen has been a member of the Inorganic Chemistry Division since 2000, and is also a member of the subcommittee on Isotopic Abundance Measurements. He has contributed as lead author to IUPAC technical reports on isotope-abundance variations of selected elements, and on atomic weights of the elements.

Subcommittee Members Teach Short Course on Medicinal Chemistry

The Subcommittee on Medicinal Chemistry and Drug Development of the IUPAC Chemistry and Human Health Division (Div VII) held its last meeting in Rio de Janeiro, Brazil, to coincide with the XI Summer School in Pharmaceutical and Medicinal Chemistry at the Laboratory of the Federal University of Rio de Janeiro. About 200 students participated in the Summer School, organized by Professor Eliezer J. Barreiro. Within the framework of this Summer School, the subcommittee members taught a short course (a total of 11 hours) entitled "Highlights in Medicinal Chemistry" in which about 40 postgraduate students and postdoctoral researchers participated. The subcommittee met all day on 13 February, while the course went from 14–18 February 2005.

The short course was distinctive because most of the lecturers are also inventors of drugs, so they provided real insight into the process of new drug discovery. The caliber of lecturers, the excellent organization of Prof. Barreiro, and the interest of the students created a good atmosphere. The subcommittee was very satisfied with the weeklong format and schedule and agreed that such events will spark interest in IUPAC among young scientists.

Highlights in Medicinal Chemistry—Short Course Program

Session 1

"Past Approaches to Drug Discovery—An Historical Survey," Prof. Robin Ganellin (RG, University College London, UK)

"Drug Discovery in Traditional Medicine," Dr. Mukund Chorghade (MC, Chorghade Enterprises, USA)

"Design and Discovery of Viramune—A Marketed Anti-AIDS Drug," Dr. John Proudfoot (JP, Boehringer-Ingelheim, USA)

Session 2

"Current AIDS Therapeutics—Examples of Modern Drug Discovery at Work," JP

Process Chemistry, MC

Session 3

Design of a Peptidase Inhibitor, RG

Session 4

"Medicinal Chemistry of Antiulcer Agents," Dr. Jörg Senn-Bilfinger (Altana Pharma, Germany)

"Esmolol—The Birth of Soft Drug Technology—and Beyond," Prof. Paul W. Erhardt (PWE, University of Toledo, USA)

Drug Metabolism and Drug Design, PWE

Session 5

"Analog-Based Drug Discovery (an IUPAC project)," Dr. Janos Fischer (Richter Ltd, Hungary)

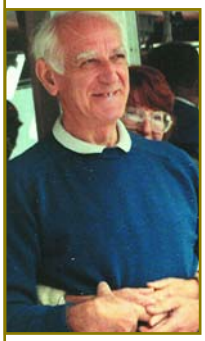
"Matrix Metalloproteinases (MMPs): Their Damage and the Effort for their Inhibition," Prof. Eli Breuer (Hebrew University Jerusalem)

For more information contact Robin Ganellin <c.r.ganellin@ucl.ac.uk>, chairman of the Subcommittee on Medicinal Chemistry and Drug Development.

www.iupac.org/divisions/VII/VII.M

Three IUPAC members with a group of Brazilian postgraduate students during the summer school: 3rd from the left, Janos Fischer; 5th: Eliezer J. Barreiro; and 6th: Eli Breuer.

Remembering Prominent IUPAC Members



Roger Cohen-Adad

The members of IUPAC's Solubility Data Committee have dedicated the next issue of *Pure and Applied Chemistry* (vol. 77, issue 3) to the memory of Professor Roger Elie Cohen-Adad, 83, who died in August 2004 in France. The issue contains lectures from the 11th ISSP (Aveiro, Portugal, July 2004), which Cohen-Adad had been unable to attend because of his illness. Cohen-Adad was one of the most prominent members of the solubility data community.

The most notable of Cohen-Adad's research activities were centered on phase diagrams and kinetics, and led to 160 publications, 3 patents, and supervision of 60 theses. He achieved a world-wide reputation for his investigations of the solubility and crystallization processes in various water-salt systems, the construction of their phase diagrams and the application of the latter. In recent years, his efforts were devoted to the thermodynamic simulation of water-salt systems and the prediction of their behavior under various conditions.

His international recognition as a scientist is based on his professional activities within IUPAC as well as his scientific work. In 1978 he was appointed as an associate member of the Solubility Data Commission of IUPAC, and from 1985-1990 was a titular member. His contributions to the work of the commission include co-editorship of Vol. 47 of the Solubility Data Series, *Alkali Metal and Ammonium Chlorides in Water and Heavy Water* (Binary Systems) (1991), and co-authorship of two chapters in the monograph, *The Experimental Determination of Solubilities* (2003).

A longer notice is published in the March 2005 issue of *Pure and Applied Chemistry,* which features papers based on presentations at the 11th Internationbal Symposium on Solubility Phenomena (Aviero, Protugual, 25–29 July 2004).

www.iupac.org/publications/pac/2005/7703

H. Steffen Peiser

Dr. H. Steffen Peiser, 87, a chemist and a physicist who was the principal liaison officer at the National Institute of Standards and Technology for the State Department, the United Nations, and other international-related organizations interested in the physical sciences, died 10 February 2005 at his home in Gaithersburg, Maryland, USA.

Much of his early work at the institute focused on crystallography, which he believed was at the center of all materials science and engineering. Peiser joined the former National Bureau of Standards in 1957, working first as a bench scientist in the field of crystallography. He directed the mass and scale section beginning in 1959, and in 1962 he was appointed chief of the crystal chemistry section. He retired officially from NIST in 1979, but continued scientific work until his death.

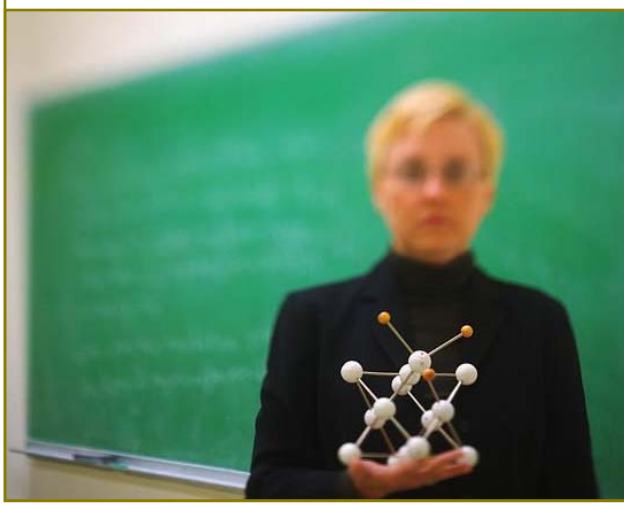
Dr. Peiser wrote more than 130 scientific papers and was honored by many scientific organizations. He was committed to sharing the benefits of metrology—the science of measurements—with developing economies throughout the world. He traveled to more than 60 countries, mostly to help them establish sound measurement capabilities to foster industrial growth.

Public Understanding of Science: Identifying IUPAC's Niche

Enhancing the public understanding of science means different things to different stakeholders, and has different meaning in the diverse global contexts represented by the IUPAC community. Yet, enhancing the public understanding of chemistry is a key element of IUPAC's mission. Because a large number of other organizations are already active in the field, determining the particular role that IUPAC can and should play, without reinventing the wheel, requires careful analysis. The Committee on Chemistry Education (CCE) approved a project that aims to help identify appropriate involvement for IUPAC in this area, as well as to give direction to the CCE, which is charged with fostering public understanding through its work to improve chemistry education.

The project will have four stages:

1. A workshop for the task group members to prepare a preliminary report, with recommendations, on effective public understanding of science initiatives based upon a review of the literature. The workshop will be held over three days in Edmonton, Canada, in May 2005.
2. A special workshop within the Beijing IUPAC General Assembly in August 2005 to consider the report from (1) above and to produce a draft report to the IUPAC Bureau on the role for IUPAC in promoting public understanding of science. Participants would be the Task Group; CCE—including the Associate Members representing the scientific divisions of IUPAC; representative(s) of the Committee on Chemistry and Industry (COCI); CHEMRAWN; and others that the IUPAC Executive Committee may nominate. The report will identify what further work, if any, needs to be undertaken to develop an IUPAC consensus on the role and strategy of IUPAC in the public understanding of science. Following the creation of that draft report, there would be consultation within IUPAC on those findings, with feedback to the Task Group.
3. A symposium within, and other contributions to, the 19th ICCE on Chemistry and Chemical Education for Humanity in Korea in August 2006. The workshops in (1) & (2) will inform the development of the program which will stimulate further advice on IUPAC's role and strategy.
4. Task group members will attend the 19th ICCE and produce a final report based upon the feedback from consultations. The report will be to the IUPAC Bureau enabling it to determine its role and strategy on public understanding of science and to engage with other scientific unions, ICSU, and other stakeholders to agree on overarching strategy and associated activities.



All task group members are members of the CCE subcommittee on the Public Understanding of Chemistry, and include Peter Mahaffy, Bob Bucat, Tony Ashmore, and Choon Do. The group welcomes your comments and suggestions on "best practices" and appropriate roles for IUPAC in building public understanding of chemistry. Contact Peter Mahaffy <peter.mahaffy@kingsu.ca> with your suggestions.

www.iupac.org/projects/2004/2004-047-1-050.html

Uncertainty Estimation and Figures of Merit for Multivariate Calibration

With the ever-increasing sophistication of analytical instruments, multivariate calibration methods are continually evolving, each with its own underlying assumptions and statistical properties. The main purpose of these methods is to produce valid predictions from highly unselective data (e.g., the quantification from near-infrared spectra). A wide variety of multivariate methods have been developed, broadly classified in terms of the tensorial order of the instrumental data. Important conceptual differences exist between first-order methods employing vector data, and second-order methods using matrix data, particularly since the latter make possible the quantification in the presence of unknown interferents. This is also reflected in the approaches followed for the estimation of figures of merit.

While univariate calibration leads to relatively sim-

ple models, and the associated uncertainty estimation and figures of merit are thoroughly covered in several official documents, multivariate calibration does not enjoy a similar status in this regard. Uncertainty estimation and figures of merit for multivariate calibration methods have become subjects of active research, especially in the field of chemometrics.

This work is intended as an introduction to multivariate calibration from a chemometrics perspective and as a review of the various proposals to generalizing the well-established univariate methodology to the multivariate domain.

Uncertainty and figures of merit are subjects of interest to IUPAC's Analytical Chemistry Division, as established within the general aims of the Division, and also in the terms of reference of its Interdivisional Working Party on Harmonization of Quality Assurance.

For more information and comments contact the Task Group Chairman Alejandro C. Olivieri <aolivier@fbioyf.unr.edu.ar>.

www.iupac.org/projects/2004/2004-041-1-500.html

A Joint OPCW–IUPAC Project on Education and Outreach Regarding Chemical Weapons

In the IUPAC report on chemical weapons (*Pure Appl. Chem.* **74**(12), 2323–2352, 2002), stress was laid on the importance of spreading knowledge of the Convention on Chemical Weapons and educating chemists and the public on the ethical aspects of these terrible applications of our science. The Committee on Chemistry Education (CCE) is charged with overseeing educational aspects of IUPAC's activities, and the matter came before the committee at its meetings. The committee was uncertain about how to proceed, for there is a fine line between educating in favor of prohibition and educating, accidentally, for propagation. At its meeting in Istanbul in August 2004, the CCE established a working party (led by Natalia Tarasova) to explore the question of how to proceed.

To take the matter forward, IUPAC President Leiv Sydnes and Task Group Chairman Peter Atkins established contact with the Organization for the Prohibition of Chemical Weapons (OPCW), based in The Hague, and attended the States Signatories session in January 2005. From that meeting, and a particularly fruitful meeting with Ralf Trapp (OPCW), we found a way forward. A meeting now planned for next July will explore the feasibility of a conference to discover if there are ways ahead in addressing problems of insinuating ethical aspects into already overburdened chemical curricula. Readers who have strong views are encouraged to send them to Atkins, who will try to compile a discussion document for the coming meeting.

For more information and comments contact the Task Group Chairman Peter Atkins <peter.atkins@lincoln.oxford.ac.uk>.

www.iupac.org/projects/2004/2004-048-1-020.html

Categorizing Hydrogen Bonding and Other Intermolecular Interactions

This project aims to 1) take a comprehensive look at intermolecular interactions and classify them and 2) create a modern definition of the hydrogen bond, taking into account all current experimental and theoretical information, and including hydrogen bonded systems both in gaseous and condensed phases, as well as in chemical and biological systems.

Hydrogen bonding has fascinated chemists and biologists for several decades now and is central to chemistry and biology. The original definition of hydrogen bonding invoked two electronegative atoms (X and Y) interacting through a hydrogen atom as in X-H•••Y. Initially X and Y were found to be mostly N, O and F which led to the mentioning of these atoms as part of the definition of hydrogen bonds in various sources (including the IUPAC Gold Book). Hydrogen bonding was inferred by the difference in physical properties between otherwise chemically similar systems such as are found between H_2O and H_2S. However, now it is well known that both H_2O and H_2S form a hydrogen bonded $(H_2X)_2$ dimer in the gas phase. Spectroscopic red shift in XH stretching frequency was among the first experimental evidence

used for inferring hydrogen bonds. Now there are several hydrogen bonded systems that appear to show blue shift in XH stretching frequency. More interestingly, these systems have CH as the hydrogen bond donors, which was against conventional wisdom. The CH•••O interactions have been well established now in organic and biological systems through crystalline structure analysis and NMR methods. Traditionally, hydrogen bond acceptors interact through a lone pair or p bonded pair electrons. However, optically active hydrogen bonded complexes involving radicals have been found in the atmosphere. Matrix experiments and theoretical studies have shown that a CH_3 radical could form a complex with H_2O, which could be represented as C•••HO. Are these one electron hydrogen bonds with C as the acceptor? There have been reports on X-H•••σ interactions where σ electrons act as hydrogen bond acceptors. Dihydrogen bonds have been observed in which H in XH (X=electronegative) interacts with another hydrogen in MH (typically a metal hydride) with partial negative charge. Moreover, there have been numerous reports on H_2 molecular complexes in the literature—should these be regarded as containing hydrogen bonds?

Electrostatic interaction was identified as the dominant factor for hydrogen bonds. Recent NMR and Compton scattering experiments have given evidence for partial covalency in hydrogen bonds. Dispersion forces have been shown to dominate hydrogen bonded complexes of second row hydrides (HCl and H_2S). Chlorine monofluoride (ClF) has been shown to form weakly bound complexes with bases very much like HF and these have been identified as chlorine bonded complexes. Such chlorine bonding interactions have been observed in crystal structures as well. Hydrogen bonding, electrostatic interactions, and van der Waals interactions are all loosely and interchangeably used in the field. Often van der Waals forces are equated with dispersion forces, though the origin of van der Waals forces (from the equation named after him) should include all intermolecular forces. Should rare gas complexes such as Ar-Ne be called London molecules instead of van der Waals molecules, as only London dispersion forces contribute to the stabilization of Ar-Ne? Should Ar-HF be called hydrogen bonded or van der Waals complex? This project will attempt to give a modern definition of a hydrogen bond that is as inclusive as possible. Also, intermolecular interactions will be categorized logically considering the physical forces involved.

The task group is chaired by Elangannan Arunan (Bangalore, India) and Steve Scheiner (Utah, USA). Other members are Ibon Alkorta (Madrid, Spain), David C. Clary (Oxford, UK), Robert H. Crabtree (New Haven, USA), Joseph J. Dannenberg (NY, NY, USA), Gautam R. Desiraju (Hyderabad, India), Henrik G. Kjaergaard (Otago, New Zealand), Roger A. Klein (Bonn, Germany), Karl Kleinermanns (Düsseldorf, Germany), Anthony C. Legon (Exeter, UK), Benedetta Mennucci (Pisa, Italy), David J. Nesbitt, (Colarado, USA) and Joanna Sadlej (Warsaw, Poland).

The Task Group will hold a workshop in Pisa from 5–9 September 2005. All the participating members of the Task Group will be presenting a summary of their recent work in the area of hydrogen bonding and molecular interactions and will also give their views about the classification of inter- and intra-molecular interactions. The Task Group will hold several rounds of discussion during the workshop. It is intended that a provisional position paper will be produced at its conclusion. There will also be sufficient room for an additional 25–30 non-task group participants to take part in the workshop. Anyone interested in participating should contact either Elangannan Arunan <arunan@ipc.iisc.ernet.in> or Roger Klein <klein@institut.physiochem.uni-bonn.de>.

For more information, contact the Task Group Chairman Elangannan Arunan <arunan@ipc.iisc.ernet.in>. Comments and suggestions from IUPAC members or anyone else interested in the project are welcome.

www.iupac.org/projects/2004/2004-026-2-100.html

Comparable pH Measurements by Metrological Traceability

After the completion of "The Measurement of pH. Definitions, Standards, and Procedures (IUPAC Recommendations 2002)," *Pure Appl. Chem.* **74**, 2169–2200 (2002), a workshop on the "Importance of Traceable pH Measurements in Science and Technology" was held at PTB/Braunschweig, Germany, in September 2001. The workshop, which was organized and promoted by members of this project's task group, attracted a wide range of participants and revealed priorities and strong interest from the concerned community for continuing action. The meeting set the following objectives:

- to implement traceability chains for pH values in

routine measurements in order to achieve target uncertainties for specific applications
- to develop educational and quality control tools for reference and testing laboratories under the observation of chemical and metrological principles
- to improve the comparability and the assessment of pH values

The project, which has the support of the Analytical Chemistry Division, the Physical and Biophysical Division, the Chemistry and Environment Division, and the Committee on Chemistry and Industry, is scheduled to take three years and will be carried out in two parts pertaining to pH measurements in complex matrices:
- Part I—pH Measurements in water quality monitoring and assessment
- Part II—pH Measurements of clinical, biochemical, and environmental relevance

The task group consists of worldwide experts in the field, which aims to impact the scientific community due to both the relevance of the subject and the multiple scientific aspects involved in pH measurement and assessment.

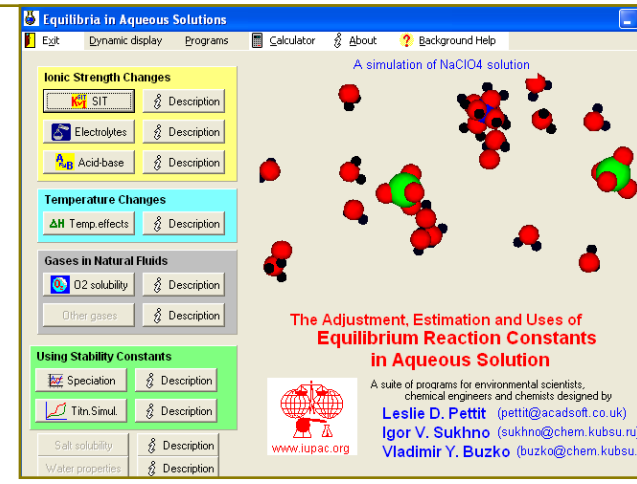
For more information contact the Task Group Chairman Maria Filomena Camões <fcamoes@c.ul.pt>.

www.iupac.org/projects/2004/2004-005-2-500.html

Equilibria in Solution: A Software Aid

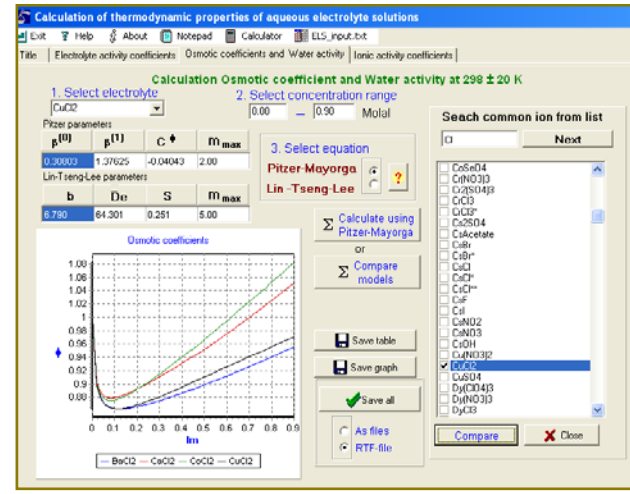
Igor V. Sukhno, Vladimir Y. Buzko, and Leslie D. Pettit, members of the task group for the project titled Ionic Strength Corrections for Stability Constants (project # 2000-003-1-500) are reporting the availability of ***Aq-Solutions***, a software package of programs for the quantitative treatment of equilibria in solution.

Aq-Solutions consists of a controlling program (Aq_Solutions.exe). This gives access to a suite of programs which, it is planned, will be regularly extended and updated. Programs are included for the quantitative correction of stability constants for ionic strength changes and temperature changes, for the calculation of gas solubilities, for speciation and for titration simulations.



SIT corrects stability constants for changes in ionic strength using SIT (Specific Interaction Theory) and to estimate SIT parameters with full statistics. The program contains an editable database of published SIT parameters. It also provides routines to inter-convert molarities (c) and molalities (m), and lg K_c and lg K_m. A version of the SIT program to correct stability constants for changes in seawater salinity and in electrolyte mixtures (fluids) is in preparation.

Electrolytes calculates electrolyte activity coefficients, osmotic coefficients and the activity of water using Pitzer and the Lin-Tseng-Lee equations. The program can also be used to calculate ionic activity coefficients using the Millero-Pitzer method. A version of the Electrolytes program, which will calculate the ionic activity coefficients for the most important ions in seawater is in preparation.



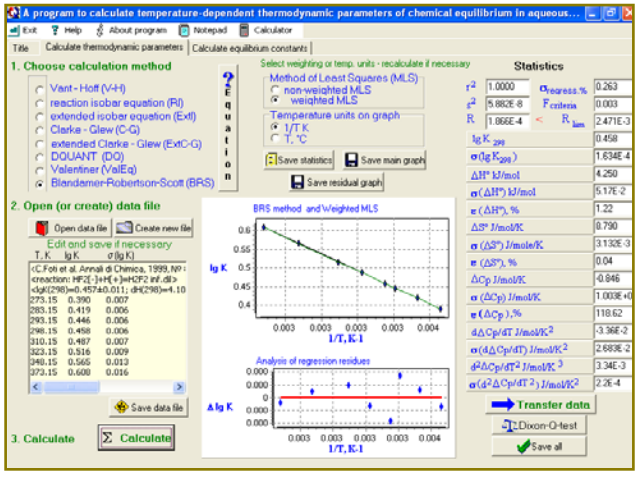
Acid-base calculates the composition of acid-base systems at equilibrium in electrolyte solutions and

seawater. It will also calculate H^+ activity coefficients for correction of pa_H to $p[H^+]$ in different ionic media. The concept of apparent equilibrium constant is used to calculate equilibrium constants for more than 260 mono and polycarboxylic acids with background ions. A version of the Acid-base program to calculate the H^+ activity coefficient in seawater at different salinity (chlorinity), and at different temperatures, is in preparation.

Temperature effects is an aid for the study and prediction of the temperature dependence of lg *K* using eight thermodynamic equations:

—Van't Hoff equation
—Isobar equation
—Extended Isobar equation
—Clarke-Glew equation
—Extended Clarke-Grew equation
—DQUANT equation
—Valentiner equation
—Blandamer-Robertson-Scott equation

Full statistics are included.



Gas solubility calculates O_2 solubility in water, 22 electrolyte solutions, natural fluids, and seawater as a function of temperature, concentration, and salinity. A program to calculate the solubilities of other gasses is in preparation.

Speciation calculates and displays species distribution curves for complexes (including insoluble species). Speciation can be displayed as a function of pH, pL (any reactant), or total reactant concentration, and as either percentages or species concentrations (log values). When insoluble phases are present, lg *S* values may also be plotted. Both graphs and tables of numeric values may be displayed, printed, or saved to disk. The sensitivity of speciation curves to errors in lg *K* values can be demonstrated graphically.

Titration Simulations simulates M-L titration curves in real time and display speciation dynamically. Species L, HL, H2L, ML, ML2, MHL, and MH-1L may be included and stability constants adjusted in real time. Titration curves, speciation curves, and pi-charts are calculated in real time.

Other programs are in preparation and will be included at a later date. These include programs for electrode calibration, for properties of individual electrolyte solutions, and their mixtures (solubility, density, viscosity, ΔC_p, freezing-point, boiling-point, surface tension), as well as for water properties as a function of temperature, pressure, and concentration of individual electrolytes or electrolyte mixtures (a_w, pK_w, ΔH_w, ΔC_p, viscosity, density).

A preliminary version of the suite of programs may be downloaded from <www.iupac.org/projects/2000/2000-003-1-500.html> or from <www.acadsoft.co.uk>.

Please send questions and comments to the authors. Igor V. Sukhno <sukhno@chem.kubsu.ru> and Vladimir Y. Buzko <buzko@chem.kubsu.ru> are both from the Department of Chemistry of the Kuban State University, in Krasnodar, Russia. Leslie D. Pettit <pettit@acadsoft.co.uk>, Academic Software, Yorks, UK, is task group chairman.

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

Provisional Recommendations

IUPAC Seeks Your Comments

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

Graphical Representation of Configuration

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

Comments by 31 July 2005

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

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

Terminology of Polymers Containing Ionizable or Ionic Groups and of Polymers Containing Ions

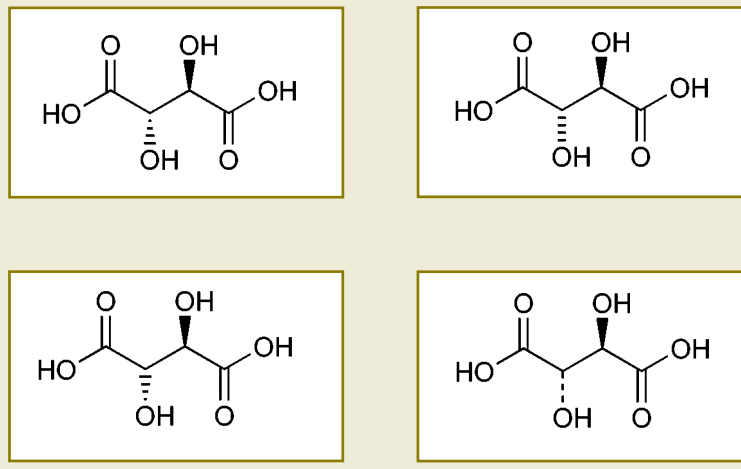
This document defines the most commonly used terms relating to polymers containing ionizable or ionic groups and to polymers containing ions. Inorganic materials such as phosphates and silicates that also may be considered ionic polymers are excluded from the present document. Only those terms that could be defined without ambiguity are considered. Terms subsidiary to the main terms are printed in bold type in notes to the main terms.

Comments by 31 May 2005

Prof. Przemyslaw Kubisa
Polska Akademia Nauk
Centrum Badan Molek. i Makromolek.
Sienkiewicza 112
PL-90 363 Lódz, Poland
TEL/FAX:+[48] (42) 684 4014/7126
E-MAIL: pkubisa@bilbo.cbmm.lodz.pl

www.iupac.org/reports/provisional/abstract04/kubisa_310505.html

Want to know which of these is the preferred diagram, and why?
Read the provisional recommendations to find out.



Practical Guide to Measurement and Interpretation of Magnetic Properties (IUPAC Technical Report)

S. Hatscher, H. Schilder, H. Lueken, and W. Urland

Pure and Applied Chemistry
Vol. 77, No. 2, pp. 497-511 (2005)

In today's magnetochemistry, superconducting quantum interference device (SQUID) magnetometers are widely used. Automated measurements of high accuracy are state of the art and have the aim to fully characterize magnetic properties of compounds and materials. The findings serve to determine electronic configuration of the magnetic center, interatomic exchange interactions, diamagnetic contributions, metallic character, superconductivity, spin-glass behaviour, superparamagnetism, and more. To take full advantage of experimental data, special attention should be given to: appropriate units, purity of the sample, measurement conditions, suitable graphical presentation of the results, and adequate models. This practical guide collects subjects that should be taken into consideration in order to present reliable magnetochemical results in a standardized way, to allow correct statements about the electronic structure of the substance under investigation, and to allow comparison between measurements. We presuppose that the reader is familiar with the basic laws and terminology of magnetochemistry.

This report points out rules to protect the magnetochemist from pitfalls in both measurement and interpretation of magnetic data. Carefully chosen magnetic field strengths during magnetic susceptibility measurements guarantee the recording of genuine data. With the help of examples, the effect of too strong applied fields is demonstrated producing magnetic saturation and, for example, quenching of weak ferro- or antiferromagnetic spin-spin couplings. In consequence, the data run the risk of being misinterpreted unless model susceptibility equations are applied that take the field dependence of χ_m into consideration. Recommendations are given for the presentation of experimental and theoretical data. The limited applicability of the most overworked formula in paramagnetism, the Curie-Weiss law $\chi_m = C/(T-\theta)$, is clearly presented (magnetically condensed systems, pure spin magnetism). While rough and ready susceptibility formulae are applicable to specific 3d and 4f systems, the complex situation for the remaining d and f centers, including actinides, demands computer programs that consider simultaneously interelectronic repulsion, ligand field potential, spin-orbit coupling, interatomic exchange interactions, and applied magnetic field.

www.iupac.org/publications/pac/2005/7702/7702x0497.html

An Ontology[1] on Property for Physical, Chemical, and Biological Systems

by René Dybkaer

APMIS Suppl. 2004 (117):1-210. PMID: 15588029
ISBN 87 9900100

Recently, one of the most distinguished scientists in laboratory medicine, Dr. René Dybkaer, defended a dissertation at the University of Copenhagen. According to Dr. Anders Kallner, former president of the Chemistry and Human Health Division, this remarkable work will have implications far beyond clinical chemistry. Dybkaer, who turned 80 recently and is still very active, was once chairman of the IUPAC Commission of Clinical Chemistry.

It is typical for scientific disciplines, such as laboratory medicine, to need to present the outcomes of examinations of a multitude of properties of many different types of objects. The special language used in each discipline is mostly found in texts on metrology, notably the *International Vocabulary of Basic and General Terms in Metrology* (VIM 1993). These sources, however, are partially conflicting, have not been established in a coherent fashion using adequate terminological procedures, and by definition relate only to quantities, ignoring all properties without magnitude.

Drawing on a variety of texts, it proves possible to form a comprehensive domain ontology around "property" with systematic definitions and terms constructed by using the tools provided in recent ISO International Standards on terminology work, supplemented by a few extra concepts to clarify the discussion. The backbone of the concept system is furnished by "system" including "component" and associated with "property", further connected by consecutive associative relations to "examination procedure", "examination", "property value", and "property value scale". The description is supplemented by "kind-of-property" to indicate a generic concept for mutually comparable properties.

From each of these vertebral superordinate concepts, specific concepts are intensively defined and given systematic terms using the modifiers 'nominal', 'ordinal', 'differential', and 'rational'. Each of the ensuing coordinate concepts corresponds to a typical allowed mathematical and statistical treatment of the property values (i.e., fundamentally the respective applicability of the operators (=, #), (>, =, <), (+, -), and (x, :) in four increasing sets obtained by cumulation to the right.

For the narrower field of metrology, ignoring nominal properties, an alternative concept system is presented based on "quantity", which covers all properties having magnitude. The following subordinate level separates "ordinal quantity" and "unitary quantity", the latter covering in its turn the specific concepts "differential quantity" and "rational quantity".

Supplementary concepts comprise "examinand" and "measurand", "examination method" and "measurement method", "examination principle" and "measurement principle", "true property value" and "examined property value", as well as the well known "measurement", "quantity value", and "numerical value". Also "examination result" and "measurement result" with respective "examination uncertainty" and "measurement uncertainty", as well as "quantity value scale" are defined.

For differential and rational properties, the concept "metrological unit" is essential to their measurement and expression of unitary quantity values, although the term for a unit does not indicate the kind-of-quantity. Furthermore, great advantage accrues from creating a "system of metrological units", preferably a universal "coherent system of metrological units". Currently, this is the "International System of Units," SI, formed from specific concepts of "base metrological unit" (seven in all) and "coherent derived metrological unit" (a large number), with multiples and submultiples obtained by SI prefixes; these concepts are defined as well as "off-system metrological unit" and "in-system metrological unit". The lack of a special term for "metrological unit one" is discussed with support for the proposal 'uno' by the CIPM Consultative Committee for Units. The *BIPM Brochure* on the SI has no formal definitions, but a concept system can be inferred from the text. Its insistence that "SI unit" only comprises base and coherent derived metrological units creates practical problems; a modified concept diagram that solves them is suggested.

The further abstraction of "unitary kind-of-quantity" via "metrological unit" leads to "metrological dimension", which is a powerful tool in "dimensional analysis" based upon the defining algebraic relationship between unitary kinds-of-quantity. As is the case for metrological unit, a metrological dimension does not identify a unique corresponding unitary kind-of-quantity. Also "base metrological dimension" and "derived

1 Ontology, *n.* the branch of metaphysics that studies the nature of existence (*Random House Dictionary*)
Ontology *n.* philosophy concerned with the nature of being (*Oxford Dictionary*)

metrological dimension" can be defined, as well as the much discussed "derived metrological dimension one".

The designations for singular properties have been given a syntactic structure and semantic rules during 40 years of work within IUPAC, the IFCC (International Federation of Clinical Chemistry and Laboratory Medicine), and lately the CEN (Comité Européen de Normalisation). It is proposed that the tripartite general concept comprising "system", "component", and "kind-of-property" enters into the definition of "dedicated kind-of-property". It is shown that the CEN Technical Committee 251 semantic model for definitions and terms of specific concepts utilizing generative patterns can be applied in forming representations of such dedicated kinds-of-property.

Finally, it proves possible to regard representations of individual concepts under "property" and "property value" in a mathematical and logical formalism operating according to the definition of a given dedicated kind-of-property. Examples are given for relation or function within Set Theory or Object-Oriented Analysis. The Set-Theoretical relation appears most flexible and leads to a definition of "Set-Theoretical representation of dedicated kind-of-property".

The outcome of the investigation is a concept system with definitions and systematic terms permitting unambiguous description of dedicated kinds-of-property (except those involving vectors and tensors), designations for singular properties, and examination results encountered in laboratory work.

René Dybkaer is working at the Department of Standardization in Laboratory Medicine at the Frederiksberg Hospital and at the Faculty of Health Sciences at the University of Copenhagen. Dybkaer has been an active member in IUPAC since the 1970s, and is currently involved with the Interdivisional Working Party for Harmonization of Quality Assurance (of the Analytical Chemistry Division) and the Subcommittee on Nomenclature, Properties, and Units in Laboratory Medicine (of the Chemistry and Human Health Division).

Spectroscopy of Partially Ordered Macromolecular Systems

J. Kahovec (editor)

Macromolecular Symposia, Vol. 220
Wiley-VCH, 2005, pp. 1-175
ISBN 3-527-31323-0

Partial order has become one of the most important themes of scientific research in the field of both natural and synthetic macromolecular systems.

Indeed, some kind of dynamic order is the prerequisite of any function of a molecular system, be it catalytic function of, for example, some complex of enzymes or some targeted mechanical, electrical, or optical function of a nanoscale molecular device. The classical tools for examining order, such as diffraction, scattering, or microscopy, often fail to reflect partial order in a satisfactory way. At the same time, molecular spectroscopy, mostly represented by nuclear magnetic resonance (NMR) and vibrational (infrared and Raman) spectroscopy, has shown the ability to examine order in such systems on a semi-local or even larger scale, although its primary objective is the local aspect of molecular structure.

Partial order can sometimes offer a challenge to spectroscopic methods. For instance, lowered local mobility due to molecular ordering can broaden signals in high-resolution NMR and lead to their complete loss in extreme cases. In a complementary way, highly mobile disordered molecules could resist detection by cross-polarization in solid-state NMR. However primarily unpleasant, these phenomena were turned into an advantage and ingeniously utilized in the characterization of structure.

The two main branches of spectroscopic observation of molecules, vibrational and NMR spectroscopy, have been known to reveal somewhat complementary aspects of structure from the points of view of their time-window (molecular dynamics) and locality of reflected structural motifs. With the development of new theoretical and experimental approaches, both methods gradually overcame their respective limitations in the recent decade. Nonetheless, their remaining differences are an additional source of valuable information for the examination of partial order in macromolecular systems.

All these and other aspects were addressed by an international conference on the Spectroscopy of Partially Ordered Macromolecular Systems, which was held 21-24 July 2003 in Prague, Czech Republic. It was organized under the auspices of IUPAC by the Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic as the 22nd of its annual discussion conferences on macromolecules. In this volume, some of the most important contributions are reproduced.

www.iupac.org/publications/macro/2005/220_contents.html

Coordination Chemistry

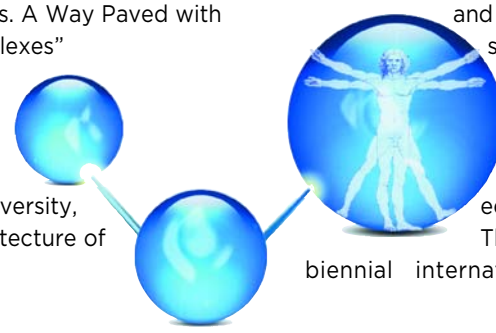
by Silvia E. Castillo-Blum

The **XXXVIth International Conference on Coordination Chemistry** was a Mexican-American Joint Meeting that took place in Mérida, Yucatán, México, from 18–23 July 2004. This international meeting is biennial, and in keeping with its tradition covered new developments in coordination chemistry, including bioinorganic chemistry, nano- and supramolecular chemistry, catalysis, main group element coordination chemistry, d and f element coordination chemistry, functional materials, and reaction mechanisms.

ICCC36 attracted 1150 participants from 57 different countries. The meeting was held under the auspices of IUPAC and the Mexican Academy of Science and the Division of Inorganic Chemistry of the American Chemical Society.

The scientific program embraced all aspects of modern coordination chemistry. There were 10 plenary lectures, whose authors and titles are as follows:

- Claudio Luchinat (University of Florence, Italy) "Metal Ions in Life Sciences Today"
- Daniel G. Nocera (MIT, USA) "The Molecular Chemistry of Renewable Energy"
- Martin Schröder (University of Nottingham, UK) "Redox Active Macrocyclic Complexes: But Where is the Electron?"
- Marcetta Y. Darensbourg (Texas A&M University, USA) "Models of Organometallic Reaction Mechanisms in Metalloenzymes: the Hydrogenases"
- Jean Claude Bünzli (Swiss Federal Institute of Technology, Lausanne, Switzerland) "Controlling Functionalities in 4f-4f and 4f-3d Polymetallic Edifices"
- Bart Hessen (University of Groningen, The Netherlands) "Coordination Chemistry of Cationic Transition-Metal and Lanthanide Organometallics: Implications for Catalyst Action and Stability"
- Michel Verdaguer (Université Pierre et Marie Curie, France) "Molecular Magnetism: From Coordination Chemistry to Nanosciences. A Way Paved with Oxalate and Cyanid Complexes"
- Angeles Paz-Sandoval (Cinvestav, I.P.N., México) "Half-Open Metallocenes with Heterodienyl Ligands"
- Jinwoo Cheon (Yonsei University, Korea) "Shaping the Architecture of Inorganic Nanocrystals"
- Ian Manners (University of Toronto, Canada) "Catalytic Routes to Rings, Chains, and Macromolecules Based on Main Group Elements"



In addition, 70 invited lectures and 270 oral contributions were presented in eight parallel sessions. Additionally, 510 posters were presented in two afternoon posters sessions.

The pleasant environment, the special ambience of the conference location, and the Mexican hospitality contributed considerably to the great success of ICCC36. The conference also featured an exhibition that included publications, scientific equipment, and chemical companies.

The program of the conference was released in the form of a book of abstracts and also in a CD version. Publications related to the conference will appear in a special issue of *Coordination Chemistry Reviews* dedicated to ICCC36.

The next conference in this series, ICCC37, will be held 13–18 August 2006 in Cape Town, South Africa. The chairman is Prof. Klaus Kock. The Web site for this conference is <www.sun.ac.za/chemistry/37iccc>.

Dr. Silvia E. Castillo-Blum <blum@servidor.unam.mx> is a professor in the Inorganic Chemistry Department at the Universidad Nacional Autónoma de México. Castillo-Blum served as the conference secretary for ICCC36.

Polymer Networks 2004

by Ferenc Horkay

The **Polymer Networks 2004 Conference** (17th Polymer Networks Meeting) was held in Bethesda, Maryland, USA, from 15–19 August 2004. The conference was organized under the auspices of IUPAC by the National Institutes of Health (NIH), the National Institute of Standards and Technology (NIST), and the Polymer Networks Group.

The conference chairs were Dr. Eric Amis (NIST) and Dr. Ferenc Horkay (NIH). Financial support was obtained from the National Institute of Child Health and Human Development, NIST, and the National Institute of Biomedical Imaging and Bioengineering.

The conference is part of a series of biennial international meetings that began in

Strasbourg, France, in 1975. The Polymer Networks Conference series has developed through the years to become a unique forum for the discussion of all topics relevant to the formation, structure, properties, and applications of synthetic and biological networks and gels. The theme for the Polymer Networks 2004 Conference was "Research of Gelation Phenomena and Properties of Synthetic and Biopolymer Gels." The most recent advances from eight topical categories were presented and discussed:

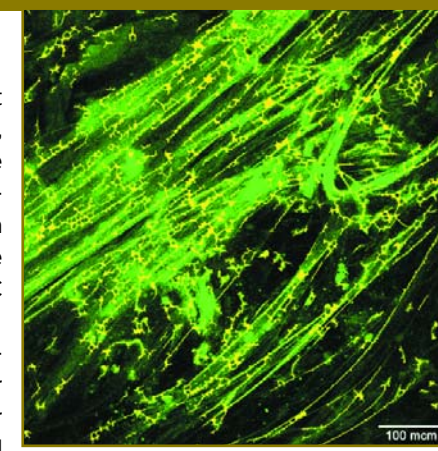
- Phase Transition in Synthetic and Biopolymer Gels
- Associating/Self-Assembly Systems
- Polyelectrolytes and Intelligent Gels
- Controlled Synthesis of Networks
- Tissue Engineering and Hydrogel Scaffolds
- Nano-Particles in Diagnostics and Therapeutics
- Gene and Drug Delivery
- Simulation and Modeling of Polymer Networks

The scientific program featured 24 invited lectures, 72 contributed talks, and 92 poster contributions. The invited lectures (complete list available at <www.polymer.nichd.nih.gov>) were delivered by the following individuals:

- Kristi Anseth (University of Colorado)
- Peter Basser (NIH)
- Frank Bates (University of Minnesota)
- Ben Chu (State University of New York, Stony Brook)
- Edmund DiMarzio (NIST, University of Maryland)
- Jack Douglas (NIST)
- Erik Geissler (University of Grenoble)
- Alan Grodzinsky (MIT)
- Gregory B. McKenna (Texas Tech University)
- Murugappan Muthukumar (University of Massachusetts)
- Ralph Nossal (NIH)
- Adrian Parsegian (NIH)
- Costas Patrickios (University of Cyprus)
- Buddy Ratner (University of Washington)
- Simon Ross-Murphy (King's College)
- Ron Siegel (University of Minnesota)
- Rocky Tuan (NIAMS, NIH)
- Julius Vancso (University of Twente)
- Pedro Verdugo (University of Washington)
- Newell Washburn (NIST)
- Miklos Zrinyi (University of Budapest)

Professor Robert F.T. Stepto (UMIST, Manchester, UK), the official IUPAC representative, gave an excellent lecture about the IUPAC organization.

Overall, the conference was a major success, with over 300 attendees and twice the number of paper submissions as in earlier years. The attendees represented 26 different countries spanning five different continents. Contributed talks were held in two parallel sessions. The posters were on display for the duration of the conference, and extended lunch breaks and a designated poster session allowed ample opportunity for discussion of them. Both IUPAC and the Polymer Networks Group gave poster awards for best student presentations. The IUPAC Poster Prizes were awarded to **Ashish Batra** (Cornell University) and **Samir A. Shah** (Wake Forest University).



DNA (green) polymer network in the airway secretion from a cystic fibrosis patient, overlaid with the computer assisted identification of the polymer filaments (yellow). Measurements of the DNA polymer network, and its effect on the viscoelastic properties of the secretions, can be used to improve the respiratory function of patients with cystic fibrosis. From the poster "Quantification of Biopolymer Filament Structure," by IUPAC Poster Prize Winner Samir A. Shah.

The conference succeeded in maintaining a very high scientific standard and providing an interdisciplinary forum for physical scientists, engineers, biologists, and clinicians to meet and discuss their work, exchange ideas, and assess the latest developments in this rapidly expanding field of science.

A selection of the papers from the conference will be published in *Macromolecular Symposia*. The next meeting in the series, Polymer Networks 2006, will be held in Sheffield, England, UK.

Ferenc Horkay <horkay@helix.nih.gov> is a researcher in the Section on Tissue Biophysics and Biomimetics at the National Institute of Child Health and Human Development of the National Institutes of Health. Dr. Horkay was one of the organizers of Polymer Networks 2004.

Trace Elements in Food

by Michael Bickel

The **2nd International IUPAC Symposium on Trace Elements in Food** (TEF-2) was held 7–8 October 2004 in Brussels, Belgium. The objectives of the conference were as follows:

- present state-of-the-art analytical methods for the enforcement of legal limits of trace elements in food
- disseminate new ideas and findings within the scientific community
- provide a forum for the exchange of new ideas and experiences among R&D organizations, governments, and industry
- bring together experts in the field with newcomers

Approximately 100 participants from 25 countries attended the IUPAC-sponsored conference, which was organized by the Institute for Reference Materials and Measurement's (IRMM) Food Safety and Quality unit. The conference, which featured 26 lectures (12 invited) and 56 posters, was organized into the following four sessions:

- Session 1: Trace Element Bioavailability, Toxicology, and Nutritional Aspects
- Session 2: Trace Elements in the Food Chain, Including Effects of Processing and Legislation
- Session 3: Fortified Food Supplementation—Legislation, Manufacturing, and Labelling Standards
- Session 4: Advances in Trace Element Analysis in Food (Special attention was paid to trace element speciation, quality control, and quality assurance.)

Following are some summarized highlights from the conference:

- The conference covered the effects of selenium—both toxic and beneficial—including concentration and speciation analysis; behavior in metabolism, concentrations in soil, feed stuff, and animals; intake through natural and fortified products; role in illness prevention (cancers, liver necrosis); and toxic effects due to overdoses.
- Other toxic metals, such as lead and cadmium, and essential ones like iron, manganese, and zinc were widely discussed in terms of their occurrence in the food chain and their local and/or regional concentration or speciation.
- Interest is slowly developing in trace elements (e.g., the platinum group of elements), which have been quite neglected with respect to food matters.
- New species of elements, such as arsenosugars, arsenolipids, or thioarsenic compounds, were discussed.
- Isotope specific methods are of steadily growing importance in the food analysis sector. Mass spectrometry-based methods are increasingly used to obtain results in straightforward concentration determination, speciation, determination of geographical origin, and food authentication. A particular method involves using ICP-MS, both high and low resolution, coupled to liquid chromatography devices, most often HPLC. But, many new methods using "conventional" apparati are being developed that aim to reveal more different species at the same time. Faster, less tedious methods for sample preparation and analysis are being sought, and performance parameters are being pushed to further limits.
- At the same time, quality assurance and quality control of analytical results is increasingly stressed, mainly due to existing or emerging requirements from customers or regulators of the laboratories. Related issues, such as the use of reference materials, use of proficiency testing, metrological matters, and chemometry are increasingly the subject of vigorous debate.

As a whole, the field of trace elements in food is a lively research area that generates interest and involvement from researchers, authorities, industry, and, of course, consumers, who often trigger interest from the other sectors.

TEF-3 will be held in October 2008 in Pau, France. It will be organized by Ryszard Lobinski.

Dr. Michael Bickel <michael.bickel@cec.eu.int> served as the chairman of the Organizing Committee for TEF-2. He currently works at the Institute for Reference Materials and Measurements in Belgium.

Chemical Education and Sustainable Development

by Natalia P. Tarasova

The **2nd International Conference on Chemical Education and Sustainable Development** took place 16–18 November 2004 in Moscow, Russia. It was held at D. Mendeleyev University of Chemical Technology of Russia and at the headquarters of the Russian Academy of Sciences. The conference was sponsored by IUPAC, the Russian Academy of Sciences, the Russian Regional Environmental Center, the Department of Usage of Natural Resources and Protection of the Environment of Moscow Government, and the Institute of Chemistry and Problems of Sustainable Development of the D. Mendeleyev University.

The conference was dedicated to the U.N. Decade of Education for Sustainable Development (July-August 2004 *CI*, p. 3). In December 2002, the U.N. General Assembly adopted a resolution to observe a U.N. Decade of Education for Sustainable Development, lasting from 2005 to 2014.

Education as the foundation of sustainable development was reaffirmed at the Johannesburg Summit, as was the commitment embodied in Chapter 36 of Agenda 21 of the Rio Summit in 1992. Education was recognized as a tool for addressing important questions such as rural development, health care, community involvement, HIV/AIDS, the environment, and wider ethical/legal issues such as human values and human rights.

There is no universal model of education for sustainable development. While there will be overall agreement on the concept, there will be nuanced differences according to local contexts, priorities, and approaches. Each country must define its own priorities and actions. The goals, emphases, and processes must, therefore, be locally defined to meet the local environmental, social, and economic conditions in culturally appropriate ways.

Education for sustainable development is equally relevant and critical for both developed and developing countries. That is why more that 250 participants from Russia and CIS countries, as well as from Greece, UK, Italy, USA, and Iran gathered in Moscow to share ideas and thoughts. Attendees represented different levels of educational systems, academia, and research institutions.

The program consisted of 9 plenary lectures, 68 oral presentations, and nearly 80 posters. The plenary lectures covered the problems of sustainable development and demonstrated the interdisciplinary character of the issue and stressed the role of chemistry in education for sustainable development. The presentations and posters were organized in the following four sessions:

- Social and Economic Aspects of Sustainable Development
- Education for Sustainable Development and Environmental Problems
- Problems of Energy- and Resource-Saving in the Context of Education for Sustainable Development
- Education for Sustainable Development and Industrial Safety

Following is a list of the plenary lecturers and their lecture topics:

- Dennis Meadows (Laboratory for Interactive Learning, USA), "The Limits to Growth: 30 Years Later"
- Pavel D. Sarkisov (Mendeleyev University, Moscow, Russia), "Problems of Energy- and Resource-Conservation in Chemical Technology and

(L to R) E. Lokteva (Russia), N. Tarasova (Russia), L. Tryetyakova (Russia), A. Taherpour (Iran), D. Meadows (USA), [Bronze Head of D. Mendeleyev], G. Yagodin (Russia), O. Nefedov (Russia), P. Sarkisov (Russia), C. Otter (UK), P. Atkins (UK), P. Tundo (Italy), V. Ivanov (Russia), and V. Petrosyan (Russia).

Sustainable Development"
- Peter Atkins (Oxford, UK), "Communicating Chemistry: the Challenge"
- Yury D. Tretiyakov (Moscow State University, Russia), "Creators of the New Knowledge: Experience of Interdisciplinary Educational Programmes in Moscow State University"
- Gennady A. Yagodin (D. Mendeleyev University, Moscow, Russia), "Education in Environmental Sciences and Sustainable Development as a Basis of School Education"
- Pietro Tundo (Universita ca Foscari di Venezia, Italy), "Green Chemistry as a Tool for Education"
- Natalya P. Tarasova (D. Mendeleyev University, Moscow, Russia), "Adaptation to Changes in the Context of Modern Education"
- V.S. Timofeev (Lomonosov Moscow State Academy of Fine Chemical Technology, Russia), "Lifetime Learning as an Important Instrument of Sustainable Development of Industry and Society"
- A.E. Kostin (Corporative Social Responsibility, Russian Center), "Distribution of Sustainable Development Ideas and Corporative Social Responsibility of Businesses in Russia"

The scientific level of the symposia was very high as evidenced by intense discussions after the presentations. Representatives of the chemical industry, NGOs, researchers, and educators exchanged thoughts and ideas. The poster sessions were also very lively, with the students and young researchers presenting their data with great enthusiasm.

Two one-day satellite workshops for high school and college chemistry teachers attracted a lot of attention. The workshop "What Sustainability Really Means for Us" (Organized by D. Meadows) demonstrated how to use interactive methods while teaching complex problems of systems dynamics. Meadows was the leader of the research group for the Club of Rome's project in the early 1970s that resulted in the famous publication *The Limits to Growth*. The workshop "New Technologies in Chemical Education: Salters Chemistry" (organized by Chris Otter, University of York, UK, and T. Myassoedova, D. Mendeleyev University, Moscow) aimed to introduce the Salters approach to Russian-speaking countries. The second Russian edition of *Salters Chemistry* will be published in May 2005, so the teachers had an excellent chance to pose questions about the content and the context of the book.

The final general discussion during the last plenary session showed the similarity of problems faced by chemistry education in different countries: chemophobia, financial issues, and difficulties in the implementation of interdisciplinary programs. The participants adopted the Recommendations of the Conference, which have been forwarded to the official bodies of the Russian Federation and CIS countries.

The United Nations Decade of Education for Sustainable Development was officially launched on 1 March 2005 in New York. The UN Secretary-General Kofi Annan and UNESCO's Koïchiro Matsuura were present at the ceremony. Following the international launch, a series of regional and national launches of the Decade will take place throughout 2005. The International Conference in Moscow might be considered the forerunner of the Decade. The chemists and chemistry educators who came to Moscow helped fulfill the IUPAC mission as they contributed to the worldwide understanding and application of the chemical sciences, to the betterment of humankind.

For more information and abstracts of papers from the conference, please refer to the Web site <www.muctr.ru/~congress2/index2.htm>.

For background information on the UN Decade of Education for Sustainable Development, and an electronic version of the Draft International Implementation Scheme for the U.N. Decade of Education for Sustainable Development, please refer to <www.unesco.org/education>.

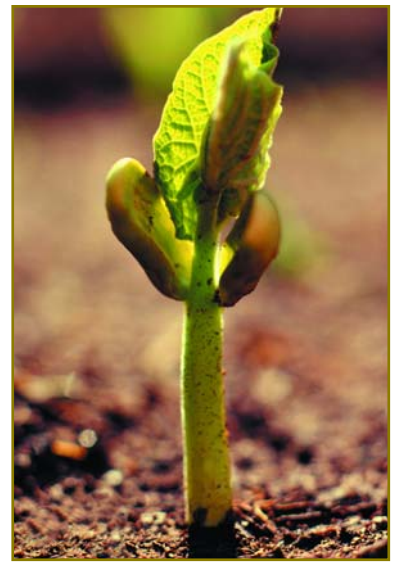
Natalia Tarasova <tarasnp@muctr.edu.ru> is director of the Institute of Chemistry and Problems of Sustainable Development at D. Mendeleyev University of Chemical Technology of Russia. She is a titular member on the IUPAC Committee on Chemistry Education.

Chemistry for Agriculture

by Adam Pawelczyk

The "Chemistry for Agriculture" series of conferences, organized annually since the 1960s, over time established a reputation as a conference with a thorough, interdisciplinary approach to chemistry, agriculture, and environmental protection. Nevertheless, it was only with the most recent conference that it attained true international status. **The XXXth International Conference "Chemistry for Agriculture,"** took place 30 November–3 December 2004 at the famous Priessnitz health resort in the town of Jesenik, Czech Republic.

The conference attracted over 200 participants from Poland, Belgium, Ukraine, Czech Republic, Slovenia, Italy, Sweden and Netherlands. Attendees included representatives of scientific institutions, industry, agriculture, and businesses affiliated with agricultural chemistry and technology, pure and applied chemistry, and environment protection.



The main topics of the conference were as follows:

- chemistry—basic research
- technology of mineral fertilizers, feed phosphates, and other additives
- phosphorus and nitrogen problem in the environment
- ecotoxicology
- development in the production of chemical agents for agriculture
- new methods of chemical products application in agriculture
- impact of chemical products on plant and animal production
- harmful substances in agriculture and the environment

The conference was inaugurated by Henryk Górecki, chairman of the Conference Scientific Committee and member of the State Committee for Scientific Research, who discussed the event's rich history, progression, prospects, and aims. Górecki emphasized how the conference provides specialists of different branches of science and industry with a unique opportunity to debate problems related to chemistry, agriculture, and the environment.

Keynote speakers were invited to give presentations covering a wide range of topics, including stabilization of Cu(III), food design, feed supplements, agroterrorism, processing of wastes into fertilizers, toxic gas sensors, mercury, ecological fuel, biopesticides, herbicides, and detoxicating preparations.

The poster sessions featured 224 posters that dealt with agriculture and environmental protection related aspects of chemistry. The sessions stimulated lively discussions and generated a number of questions from the attentive and information-hungry audience.

The Conference Scientific Committee chose the best poster presentation, which was awarded to Grazyna Kaup of the University of Agriculture (Szczecin, Poland) by Pawel Kafarski, dean of the Faculty of Chemistry.

The main organizers of the event were as follows: Wroclaw University of Technology (Poland); Institute of Mineral Fertilizers, Pulawy (Poland); Institute of Inorganic Chemistry, Gliwice (Poland); University of Agriculture, Wroclaw (Poland); and, AGROPHOS Scientific-Research Center of Chemistry, Agrochemistry and Environment Protection, Wroclaw (Poland).

The conference is becoming increasingly more renowned, and thus, with each consecutive year, it is attended by a wider audience. The organizers of the event anticipate the publication of a book that will include all presentations given during the conference.

The next conference will be held again in Jesenik, Czech Republic, in early December 2005. That conference was recently granted IUPAC sponsorship.

Adam Pawelczyk <adam.pawelczyk@pwr.wroc.pl)> has been the chairman of the Organizing Committee since 1998. He is a teacher at the Institute of Inorganic Technology and Mineral Fertilizers, Wroclaw University of Technology (Poland).

Chemical Thermodynamics

27 June–2 July 2005, Moscow, Russia

The **Russian International Conference on Chemical Thermodynamics** (RCCT-2005) will be held 27 June –2 July 2005 at the Moscow State University (MSU), Moscow, Russia. It is being organized by MSU and the Russian Academy of Sciences, under the auspices and sponsorship of IUPAC, IACT, and Elsevier. It is anticipated that 400–500 delegates from 26 countries will attend. The official languages of the conference will be English and Russian.

The aim of the conference is to review recent achievements in experimental thermodynamics and explore likely future developments. The program is focused on new experimental and theoretical results in the following fields: general topics of chemical thermodynamics, individual substances, solutions and melts, heterogeneous systems, and complex thermodynamic systems. Special attention will be paid to the problems of consistence, systematization and standardization of thermodynamic data, databases, novel materials on the base of specific substances, and composites.

The scientific program comprises plenary lectures, parallel oral sessions, poster sessions, "round tables," and an exhibition of instruments and equipment. Preliminary topics for the "round tables" include thermodynamics of nanostructures, systems in the external fields, and teaching chemical thermodynamics.

See Mark Your Calendar on page 37 for contact information

www.chem.msu.su/eng/events/rcct/welcome.html

Analytical Spectroscopy

4–9 September 2005, Antwerp, Belgium

The 34th edition of the **Colloquium Spectroscopicum Internationale (CSI XXXIV)** will take place in Antwerp, Belgium, on 4–9 September 2005. Since the first conference (France 1949) in this outstanding series, CSI has established itself as the premier forum for presentation and discussion of new developments in all branches of analytical spectroscopy. The aim of this conference is to allow spectroscopists from around the world to enhance contacts and exchange experiences. Following the tradition of the preceding CSI conferences, emphasis will be on new developments and applications of spectroscopy in analytical chemistry.

The program will consist of invited plenary lectures, oral contributions in parallel sessions introduced by invited keynote speakers, and poster sessions. The subjects within the scope of the conference include the following:

Spectroscopic Techniques and Methodologies

- atomic plasma spectrometry (ICP, GD, AAS, etc.)
- molecular spectroscopy (UV-Vis, NMR, Raman, IR)
- organic and inorganic mass spectrometry
- x-ray spectrometry (XRF, XRD, XANES, PIXE, etc.)
- hybrid techniques
- laser technologies
- imaging techniques
- quality control and chemometry

Applications of Spectroscopy

- materials and industrial processes
- environmental and geochemical analysis
- archaeometry and cultural heritage
- biological and food analysis
- clinical and pharmaceutical analysis
- speciation
- micro, surface, and interface analysis
- mass spectrometry in post-genomics and proteomics
- on-line analysis
- miniaturization and nano-technology
- actinides in the environment

See Mark Your Calendar on page 38 for contact information

www.csixxxiv.ua.ac.be

Other Upcoming Conferences

Crystallography <www.iucr2005.it>
23–31 August 2005, Florence, Italy

Solid State Chemistry <www.shef.ac.uk/materials/ecsscx>
29 August–2 September 2005, Sheffield, England, UK

Polymer Science and Technology <www.ispst2005.aut.ac.ir>
27–29 September 2005, Tehran, Iran

Enzymes <www.royalsoc.ac.uk>
14–15 November 2005, London, England, UK

Liquid Crystals <www.royalsoc.ac.uk>
5–6 December 2005, London, England, UK

Radiochemistry

17–21 October 2005, Beijing, China

The **Third International Conference of Asia-Pacific Symposium on Radiochemistry (APSORC-05)** will be held 17–21 October 2005 in Beijing, China. The first APSORC was held in Kumamoto, Japan (1997), and the second in Fukuoka, Japan (2001). The conference provides an international forum for presentation and discussion of current and emerging sciences in all fields of radiochemistry and nuclear chemistry, and their application in various other fields. Scientists, engineers, and students from universities, institutes, laboratories, and industries throughout the world are encouraged to participate and make contributions to this conference.

In addition to the discussions of the most recent experimental data and theoretical principles in all areas related to nuclear and radiochemistry, the symposium will also focus on the future frontiers of research in the field. The scientific program will consist of a series of invited plenary and keynote lectures followed by presentations of invited and contributed papers in oral and poster sessions.

The symposium will be held at the Grand View Garden Hotel in Beijing <www.gvghotel.com>, a four-star hotel with a big, beautiful garden.

See Mark Your Calendar on page 39 for contact information

www.ihep.ac.cn/apsorc2005

Ionic Polymerization

23–28 October 2005, Goa, India

The **International Symposium on Ionic Polymerization (IP 2005)**, which is IUPAC sponsored, is the 17th in the series of biannual symposia which began in 1976 in Akron, Ohio, USA. IP 2005 will address contemporary research, both fundamental and applied, in the areas of anionic, cationic, and ring opening polymerizations. Papers related to other techniques of controlled polymerization are welcome in so far as they help understand the limitation or broaden the scope of anionic, cationic, and ring opening polymerization.

A special session is also planned on the physics of materials (e.g., structures, morphology, self-organization of supermolecular structures, rheology, and modeling) prepared by techniques of controlled polymerization (anionic, cationic, ROP).

See Mark Your Calendar on page 39 for contact information

www.ncl-india.org/ip2005

Polymer Science

26–29 July 2005; Fukuoka, Japan

The **8th SPSJ International Polymer Conference (IPC 2005)** on "Emerging Horizons in Polymer Science and Technology" will be held 26–29 July 2005 in Fukuoka, Japan. IPC is a series of comprehensive meetings that SPSJ has proudly organized since 1984, to provide the world polymer community with a forum to discuss state-of-the-art topics and fundamental subjects of contemporary interest and future importance in polymer science and technology. The conference will feature the following sessions:

Selected Topic Symposia

- Frontiers in Polymerization Chemistry and Catalysis
- Dynamics in Polymers
- Fusion of Macromolecular, Supramolecular, and Organic Chemistry
- Polymers in Information-Driven Society
- Polymers in Bionanotechnology
- Polymer R & D in Industry: Policy and Perspective

General Topics

- Polymer Synthesis and Reactions
- Structure and Physical Properties of Polymers
- Polymer Processing
- Functional Polymers
- High Performance Polymers
- Bio-Related Polymers

The three-day scientific program will include 54 invited lectures and over 600 contributed papers. Online registration is now available at the Web site below.

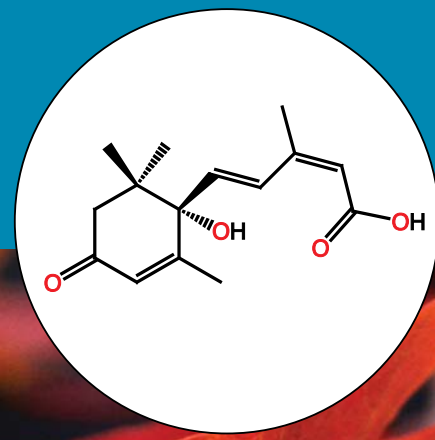
See Mark Your Calendar on page 37 for contact information

www.spsj.or.jp/english-index.htm

Announcing for June 2005

nature chemical biology

The chemistry of life science

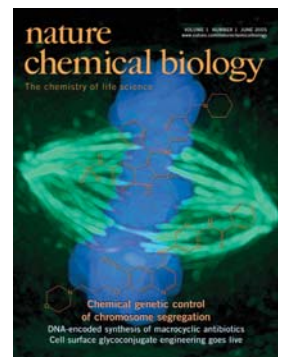


Find out more, register today!

Launching in June 2005, *Nature Chemical Biology* is a new interdisciplinary journal bringing together the most innovative and important advances across chemical biology. The scope of *Nature Chemical Biology* will cover all areas of contemporary research at the interface of chemistry and biology including:

- Chemical synthesis
- Chemical mechanisms in biology
- Expanding biology through chemistry
- Expanding chemistry through biology

Nature Chemical Biology will provide stimulating and well balanced content for a diverse readership, with the aim of bringing together a community of chemists and biologists, and fostering the exchange of ideas across traditional disciplines.



Editor: Terry L. Sheppard
Assistant Editor: Joanne Kotz

View further information and register to receive the table of contents by e-mail at:
www.nature.com/naturechemicalbiology

Nature Chemical Biology: Bringing Chemistry to Life

www.nature.com/naturechemicalbiology

nature publishing group npg

Mark Your Calendar

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

2005

IUPAC poster prizes to be awarded

9–12 May 2005 • Polymer Blends • Bruges, Belgium
Joint Meeting of the 8th European Symposium on Polymer Blends and Eurofillers 2005
Prof. Philippe Dubois, Service des Matériaux Polymères et Composites, Université de Mons-Hainaut, Place du Parc, 20, B-7000 Mons, Belgium, Tel.: +32 65 373480, Fax: +32 65 373484, E-mail: philippe.dubois@umh.ac.be

4–9 June 2005 • Polymers and Biopolymers • Réduit, Mauritius
8th UNESCO School and IUPAC Conference on Macromolecules: "*Polymers for Africa*"
Dr. Dhanjay Jhurry, Department of Chemistry, University of Mauritius, Réduit, Mauritius,
Tel.: +230 454 1041 - ext 1472, Fax: +230 465 6928, E-mail: djhurry@uom.ac.mu

20–24 June 2005 • Polymer Systems • St. Petersburg, Russia
5th International Symposium on Molecular Mobility and Order in Polymer Systems
Prof. A.A. Darinskii, Institute of Macromolecular Compounds, Russia Academy of Sciences, Bolshoi pr. 31, St. Petersburg, 199004, Russia, Tel.: +7 812 218 8750, Fax: +7 812 218 6869, E-mail: adar@imc.macro.ru

26–30 June 2005 • Polymeric Materials • Prague, Czech Republic
23rd Discussion Conference PMM Current and Future Trends in Polymeric Materials
Prof. Miroslav Raab (Chairman), c/o P.M.M. Secretariat, Institute of Macromolecular Chemistry AS CR, Heyrovského nám. 2 CZ - 162 06 Praha 6, Czech Republic, Tel.: + 420 296 809 281, Fax: +420 809 296 410, E-mail: sympo@imc.cas.cz

27 June–2 July 2005 • Chemical Thermodynamics • Moscow, Russia
Russian International Conference on Chemical Thermodynamics (RCCT-2005)
Dr. A. Ya. Borshchevsky, Chemisty Department, Moscow State University, Leninskie Gory, 119992 Moscow , Russia, Tel.: +7 095 939 53 96, Fax: +7 095 939 12 40, E-mail: borsch@phys.chem.msu.ru

10–14 July 2005 • Polymer Gels • Prague, Czech Republic
68th Prague Meeting on Macromolecules and 44th Microsymposium on "*Polymer Gels and Networks*"
Prof. Michal Ilavsky, Academy of the Sciences, Insitute of Macromolecular Chemistry, Heyrovského nám. 2 CZ-162 06 Prague 6, Czech Republic, Tel.: +420 296 809 281, Fax: +420 809 296 410, E-mail: ilavsky@kmf.troja.mff.cuni.cz

10–15 July 2005 • Electrical and Related Properties of Organic Solids (ERPOS 10) • Cargese, Corsica, France
10th International ERPOS Conference - Electrical and Related Properties of Organic Solids and Polymers
Dr. Jean-Michael Nunzi, Laboratorie POMA, UMR-CNRS 6136, Universite d'Angers
2, Boulevard Lavoisier, F-49045 Angers cedex 01, France, Tel.: +33 0 2 4173 5364, Fax: +33 0 2 4173 5216, E-mail: jean-michel.nunzi@univ-angers.fr

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

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

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

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

indicates Division or Standing Committee sponsored event at which IUPAC poster prizes might be awarded. *Read more about this on p. 14.*

Mark Your Calendar

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

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

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

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

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

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

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

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

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

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

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

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

Mark Your Calendar

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

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

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

6–9 December 2005 • **Agriculture** • **Jesenik, Czech Republic**
XXXIth International Conference - Chemistry for Agriculture
Dr. Adam Pawelczyk, Wroclaw University of Technology, Smoluchowskiego 25, 50-370 Wroclaw, Poland, Tel.: +48 (0) 71-3202930, Fax: +48 (0) 71-3203469, E-mail: adam.pawelczyk@pwr.wroc.pl

2006

IUPAC poster prizes to be awarded

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

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

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

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

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

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

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

Mark Your Calendar

7–22 September 2006 • High Temperature Materials • Vienna, Austria
12th International Conference on High Temperature Materials Chemistry (HTMC XII)
Prof. Dr. Adolf Mikula, Wahringstr. 42, A-1090 Vienna, Austria, Tel.: +43 4277 52606, Fax: +43 4277 52679, E-mail: Adolf.Mikula@univie.ac.at

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

2 0 0 7

IUPAC poster prizes to be awarded

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

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

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

Visas

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

IUPAC Poster Prizes

IUPAC Poster Prizes can be awarded at Division- or Standing Committee–sponsored event. The events are flagged in the previous calendar pages. For more information, contact the IUPAC Secretariat.

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. <www.iupac.org/symposia/application.html>.