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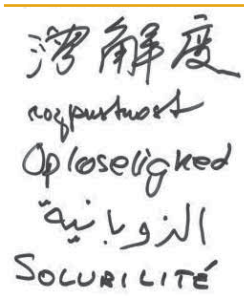
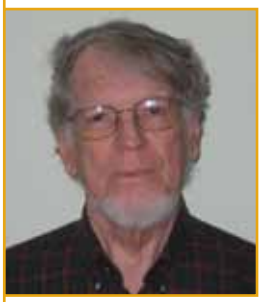
CHEMISTRY International March-April 2008 Volume 30 No. 2



Stamps International 3

The Role of ICTNS in the Project System



by Jack Lorimer

In the May-June 2006 issue of *CI*, Gus Somsen, then chairman of the Project Committee, highlighted some features of the IUPAC project system. His article described how a project progresses from an initial idea to preparation and external review of a project proposal, to assembling a Task Group and financial resources, and, finally, to starting work on the project. This article reviews what happens once a project has been completed and the Task Group prepares to publish a report. While many Task Group leaders are familiar with the requirements for publication in *Pure and Applied Chemistry* (*PAC*), the *IUPAC Handbook* contains new guidelines for preparation of reports that were published by ICTNS (Interdivisional Committee on Terminology, Nomenclature and Symbols) in 2004. These guidelines have been updated from time to time since that date to provide extended assistance to authors.

The terms of reference of ICTNS include, among other responsibilities, ". . . submission to the Bureau/Council . . . for publication or otherwise, any IUPAC document concerned with terminology, nomenclature, symbols, and other conventions." In practice, for publications destined for *Pure and Applied Chemistry*, ICTNS conducts the review of all Technical Reports and Recommendations. The chairman of ICTNS, after acceptable reviews by external reviewers and by members of ICTNS, recommends publication of an IUPAC project as either a Technical Report or as Recommendations. IUPAC Recommendations actually become official IUPAC documents after acceptance by the Council at a General Assembly. Again, in practical terms, the goal of ICTNS in the review process is to ensure that any document published in *PAC* meets IUPAC-approved standards for terminology, nomenclature, symbols and units and is of high scientific quality.

Before a Task Group prepares a Technical Report or set of Recommendations, it is expected that the authors will have consulted the Procedure for Publication of IUPAC Technical Reports and Recommendations, available on the IUPAC website under "Handbook," which sets out criteria for determining if a report is to be classified as a Technical Report or as Recommendations. The authors also are expected to have paid close attention to the next section in the "Handbook," Guidelines for Drafting IUPAC Technical Reports and Recommendations, and also have consulted a current issue of *PAC* for the style of formatting references. Authors should note that *PAC* has no copyeditor as such, but has an excellent production editor. Cheryl Wurzbacher relies on ICTNS to supply a manuscript that is as correct as possible in all details, so it is important to prepare manuscripts with care.

When the authors are satisfied with their report and its classification, they submit it to the division president for approval for submission to the IUPAC Secretariat. Upon receipt at the Secretariat, the officers of ICTNS are informed that the manuscript has been submitted, and are asked to confirm the type of manuscript and its suitability for formal review in its current form.

Occasionally, problems arise as to the nature of a manuscript: Is it a Technical Report or Recommendations? Is it acceptable for *PAC*? One new type of report that ICTNS has had to deal with is the database. The usual solution is to accept a manuscript describing the database for publication in *PAC*, but also to review the database for proper use of IUPAC terminology, nomenclature, and symbols. A few manuscripts continue to be submitted that contain new experimental material. The policy in these cases is to review the manuscript for conformity to IUPAC standards, but to inform the authors that it is not acceptable for *PAC* and that their work would get better exposure if published in a research journal.

Review of Technical Reports and Recommendations then follows two somewhat different paths. Technical Reports are reviewed within ICTNS. Reports from ICTNS reviewers are sent to the corresponding author, and usually a revised manuscript is requested. The chairman or secretary, in these roles and also in their roles as editors for *PAC*, also review the manuscript very thoroughly to check in particular that IUPAC or other acceptable names are used for all chemicals, that all symbols and units are acceptable, and to verify other editorial details such as proper formatting of references. In many cases, the editors exchange messages with the authors until all details have been settled. In other cases, other experts (usually within ICTNS) are brought into the discussion of controversial details.

IUPAC Recommendations receive a much more thorough review. Reviews are requested from all members of ICTNS, from up to 15 independent external experts suggested by the appropriate division, and from the scientific community, reached mainly through *CI* (for example, see page 25) and by posting the provisional recommendations on the IUPAC website. The public comment period lasts five months, but reviews from within ICTNS and from outside should be available within three months after posting on the website. IUPAC Recommendations, as mentioned above, eventually become official policy of IUPAC, so the extensive review provides a considerable degree of confidence that the Recommendations in question represent a consensus within the community of chemists. At the end of the public comment period, the manuscript is processed by the editors in the same way as a Technical Report, except that compatibility with, or reasonable modifications to, entries in the online "Gold Book" are also checked carefully.

It is clear that the review process for either Technical Reports or Recommendations is, in general, considerably more rigorous than the review process for manuscripts submitted to main-line research journals. The key difference is that articles in research journals contain new work that is always subject to revision if new experimental or theoretical studies so demand. IUPAC Technical Reports, on the other hand, should represent accurately the current state of a given subject, while IUPAC Recommendations are intended as firm guidelines for the world-wide chemistry community. As an editor, it is always refreshing to encounter a wide variety of comments from reviewers, comments that rarely overlap significantly.

Thanks are due to members of ICTNS for suggestions in preparing this article, and especially to Danièle Gibney, Royal Society of Chemistry, who was an observer at the 2007 Torino meeting of ICTNS and provided valuable insights from the perspective of a new participant in IUPAC.

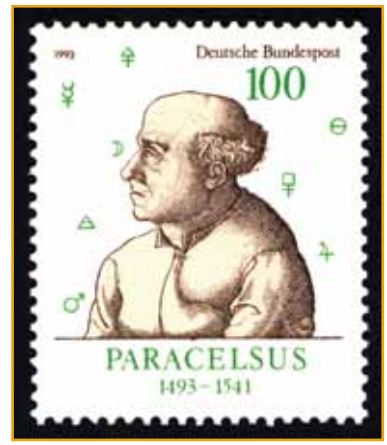
Jack Lorimer <lorimer@uwo.ca> is a long-time member of IUPAC. He has been chairman of the former Commission on Solubility Data (V.8) and of the Project Committee, and an elected member of the Bureau. He is currently chairman of ICTNS.

Stamps International

See also www.iupac.org/publications/ci/indexes/stamps.html

The Father of Toxicology?

Much has been written about Paracelsus (1493–1541), the famous alchemist, physician, and astrologer of the sixteenth century, often cited for coining the phrase "the dose makes the poison." Never the unpretentious type, he was born Theophrastus Philippus Aureolus Bombastus von Hohenheim in Einsiedeln, Switzerland, but changed his name to Paracelsus (meaning "greater than Celsus") after the renowned first-century Roman encyclopedist Aulus Cornelius Celsus. Most significantly, Paracelsus pioneered the medical use of certain elements, minerals, and chemical compounds, including mercury and opium, and he conducted experiments to learn about the human body and the nature of disease.



The stamp shown here was issued in Germany on 10 November 1993 to celebrate the 500th anniversary of Paracelsus's birth. The stamp features his likeness, based on a 1538 etching attributed to Augustin Hirschvogel, a German artist and mathematician known primarily for his etchings. In addition, the stamp displays (clockwise, starting from the lower left corner) the alchemical symbols of iron, air, silver, mercury, sulfur, salt, potash, and tin, all essential tools in the alchemists' armamentarium. Interestingly, some of these symbols were also associated with celestial bodies known at the time, such as Mars (iron), the Moon (silver), and Jupiter (tin).

Written by Daniel Rabinovich <drabinov@uncc.edu>.

Chemistry for Biology

by Torbjörn Norin and Upendra Pandit

The relationship between chemistry and biology is succinctly embodied in the often-cited statement "cells obey the laws of chemistry." In this context, it is also relevant to reflect on the opening lines of the famous paper by Watson and Crick: "We wish to suggest a structure for the salt of deoxyribose nucleic acid (DNA). This structure has novel features which are of considerable biological interest" (*Nature* April 25, 733 [1953]). The elucidation of the structure of DNA and the understanding of its implications in the fundamental processes of life laid the foundation for the transformation of biology into a truly molecular science. An important note of caution on the interaction between chemistry and biology has been wisely expressed by Arthur Kornberg (Nobel laureate in medicine, 1959): ". . . chemistry and biology are two distinctive cultures and the rift between them is serious, generally unappreciated, and counterproductive" [*Biochemistry* 26, 6888 (1987)]. Fortunately, continued developments have successfully bridged the gap between chemistry and biology. Thus, the impact of genomic research has led to further erosion of the boundaries between chemistry and biology.

. . . the impact of genomic research has led to further erosion of the boundaries between chemistry and biology.

IUPAC is alert to new developments in all areas in which the role of chemistry is implicated. In an earlier initiative, an interdivisional committee on biomolecular chemistry was established. Deliberations within this committee led to the IUPAC project "Chemistry for Biology." The focus of this project was to organize a Symposium-in-Print that would illustrate the fundamental role of chemistry in a wide variety of biological topics. The project was initiated by the Division of Organic and Biomolecular Chemistry and is actively supported by a number of IUPAC divisions and standing committees. These groups have assigned representatives to the project task group in order to provide input from their specific chemical backgrounds. Some of the task group members have contributed papers to the Symposium-in-Print.

A salient project milestone was attained upon publication of a special issue of *Pure and Applied Chemistry* that was devoted to the subject (2007, Vol. 79, Issue 12). The contributions to this symposium deal with a broad spectrum of topics that illustrate the current scientific effervescence at the interface of chemistry and biology. On one hand, structural information at the molecular level is providing new, detailed insight into biological processes. On the other, the recognition of principles underlying biological phenomena is inspiring novel ideas for solutions to important chemical challenges.

The title of the project implies a chemistry-biology relationship in which chemistry serves to provide the interpretation of biological phenomena in terms of molecular structures and chemical principles and processes. The earliest example of this relationship is provided by Friedrich Wöhler's experiment [1828] in which he prepared the known biological substance urea by heating the abiotic compound ammonium cyanate. In his letter to Jöns Jakob Berzelius, Wöhler wrote: "I must tell you that I can prepare urea without requiring a kidney of an animal, either man or dog." The results of this experiment triggered two important conceptual changes. It led to the demise of the theory of *vital force*—which was considered essential for the generation of substances of biological (i.e., natural) origin—and it represented the birth of organic chemistry as a discipline.

Scientific advances in the second half of the twentieth century have shown that as a result of the availability of structural information on biomolecules, their role in the relevant biological processes can be interpreted in terms of molecular interactions and transformations. The implication of DNA structure in the transfer of genetic information has paved the way for the elucidation of the genetic "*tri-ribonucleotide*" code which reveals the mechanism governing the structural link between the nucleic acids and proteins (i.e., nature's catalysts for all biological processes). The critical molecular dimension of these relationships is emphasized by the fact that the synthesis of proteins is regulated by ribonucleic acids (RNA) and not DNA. Furthermore, chemical synthesis of the 64 possible *tri-ribonucleotides* established the base-sequence in the ribonucleotides that code for a specific amino acid in the synthesized protein (Holley, Khorana, Nirenberg, Nobel Prize Medicine, 1968). However, despite these brilliant illustrations of the integration of chemistry and biology, there are strong divisions between the fields as Kornberg pointed out: "chemistry and biology are two distinctive cultures and the rift between them is serious, generally unappreciated, and counterproductive" [*Biochemistry* **26**, 6888 (1987)].

Broadly speaking, the difference between the cultures of chemistry and biology resides in their origin

and approach to research. Biology has its roots in the study of natural biodiversity and of phenomena associated with biotic systems. On the other hand, the practice of chemistry is anchored in the knowledge of detailed structures, interactions, and reactions at a molecular level. It is in the latter conceptual terms that chemistry interprets biological phenomena. An essential link between the two disciplines is provided by information about the molecular structure of the relevant biological system.

Today, as structural knowledge of complex biological systems progresses, the associated biological processes enter the domain of chemical interpretation and analysis. A recent example is from the extensive and elegant structural studies of the RNA polymerase transcription machinery carried out by Roger D. Kornberg (see figure 1). Kornberg was awarded the Nobel Prize in chemistry in 2006 "for his studies of the molecular basis of eukaryotic transcription."

The elucidation of the sequence of three billion nucleo-base pairs of the human DNA and the sequencing of human chromosomes—as an outcome of the Human Genome project—constitutes a historical milestone. In the years to come, the analysis of genomic data, that has become available, will continue to bear fruit in many expected ways and in some yet unpredicted areas. As could be anticipated, the enhanced interaction between biology and chemistry has had an immediate impact in the area of healthcare and medicine.

Expanding knowledge about the function of protein kinases—in intracellular signal transduction and regulation of critical cellular processes—coupled with structural data, has served as a matrix for the design of clinically useful drugs. (R.P. Araujo, L. A. Liotta and E.F. Petricoin, *Nature REVIEWS*, Drug Discovery, 2007, Vol. 6, pp. 871-880). Also see this issue's cover image of "The Human Kinome" (see box on page 6; courtesy of the Invitrogen Corporation). An impressive example is the development of the drug for the treatment of the haematological stem-cell disorder chronic myeloid leukemia (CML). This disorder involves translocations between chromosone 22 and chromosone 9, resulting in the abnormal BCR-ABL [breakpoint cluster region–Abelson] oncogene which codes for the tyrosine kinase responsible for CML. Treatment of CML has been sought in the development of specific tyrosine kinase inhibitors. Application of combinatorial chemistry coupled with high through-put screening has led to the development of several clinically useful drugs (e.g., imatinib, nilotinib, dasatinib) for the control of CML. A multitargeted kinase inhibitor named Sorafenib is currently being used for the treatment of kidney cancer that is resistant to interferon-alpha or interleukin-2. Sorafenib is also being studied for the potential treatment of other cancers, including melanoma, lung cancer, and mesothelioma.

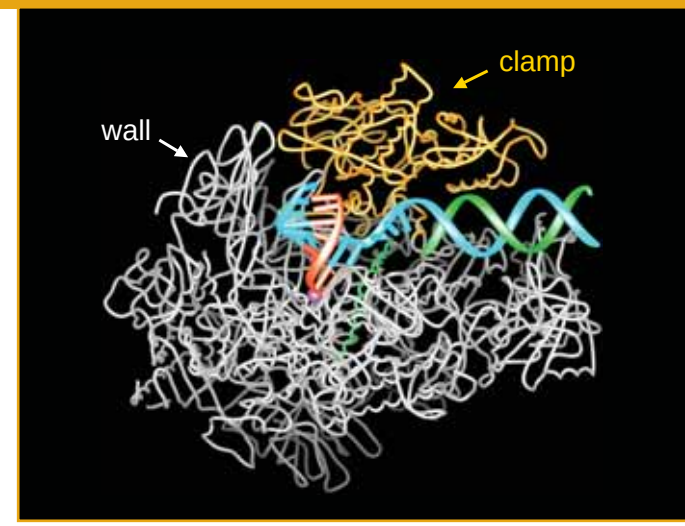


Fig. 1. Structure of RNA polymerase II in the act of gene transcription. The polypeptide chain is shown in white, orange (mobile "clamp"), and green (bridge helix connecting the two largest subunits). Backbone models of the nucleic acids are shown in blue (template DNA strand), green (nontemplate DNA strand) and red (RNA). From the Nobel lecture of Professor Roger Kornberg. Reproduced by permission from the Nobel Foundation (Les Prix Nobel, The Nobel Prizes 2006, Almquist & Wiksell International, Stockholm Sweden, 2007).

In line with its mission, IUPAC advocates the creation of strong links with other disciplines so that chemistry can play a vital role in the development of multidisciplinary perspectives. In the preceding decades, the fields of medicine and agriculture have benefitted from increased interdisciplinary interaction and coordination between chemistry and biology. While IUPAC maintains its focus on fundamental chemistry and its applications, it is alert to the emergence of new interdisciplinary areas where its relevant divisions can provide a constructive platform for rapid information-exchange and cooperative undertakings. In the context of developments at the interface of biology and chemistry, closer interaction with other international scientific organizations, such as the International Union for Biochemistry and Molecular Biology, the International Union of Pure and Applied Biophysics, and the International Society for Chemical Ecology, is a logical evolution within the framework of IUPAC.

While noting the implications of chemistry for biology, it is equally important to recognize the impact of

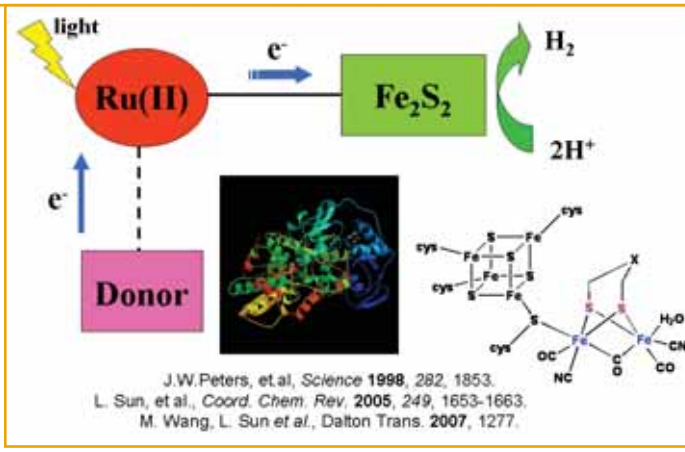


Fig. 2. Catalysts, which mimic the function of FeFe-hydrogenase active site, may have many potential applications (fuel cell technology, hydrogenation catalysts, hydrogen production). Slide from a lecture, provided by Lichen Sun (Royal Institute of Technology, Chemistry Department, Stockholm, Sweden).

cal processes are being defined in terms of detailed structural and mechanistic events is recognized as a rapidly emerging field at the interface of chemistry and biology. IUPAC responds in an effective manner to new developments in which the role of chemistry is implicated. In an early initiative, the scope of two of the IUPAC divisions of basic chemistry—Organic and Physical Chemistry—was expanded to include activities directed at understanding the chemical basis of biological phenomena.

The term coined by IUPAC for the interface between chemistry and biology is *biomolecular chemistry*; that is, the *chemistry of biomolecules*—from the humble urea to highly complex biological systems that can be defined in molecular language. It should be added that several other terms have come into use to define the field (e.g., *biological chemistry*, *chemical biology*, *chemistry-biology interface*, and *chemistry and biology*). The undersigned authors wish to emphasize that because the term *biomolecular chemistry* restricts itself to the *chemistry* of biomolecules, it more accurately defines the interface area. Furthermore, the term *biomolecular chemistry* acknowledges the unique role of biology in the study and the understanding of such biological phenomena, which, due to its level of complexity, cannot to date be described in detailed molecular terms.

Torbjörn Norin <tnorin@kth.se> is an emeritus professor at the Royal Institute of Technology (KTH), Stockholm, Sweden, and a former president of the IUPAC Division of Organic and Biomolecular Chemistry (2000–2001). He is the chairman of the task group for the current interdivisional IUPAC project on Chemistry for Biology. Upendra Pandit <U.K.Pandit@uva.nl> is an emeritus professor at the University of Amsterdam, The Netherlands, and a former president of the IUPAC Division of Organic and Biomolecular Chemistry (1998–1999). He is a task group member of the current interdivisional IUPAC project on Chemistry for Biology.

"Chemistry for Biology"—a symposium-in-print
Pure and Applied Chemistry 2007, Vol. 79, Issue 12, pp. 2179-2366

www.iupac.org/publications/pac/79/12/

Scientifiques Sans Frontières Australia

by Colin Scholes and Glenna Drisko

Malaria infects 515 million people each year, killing one to three million children, yet currently there is no vaccine.[1] Arsenic poisoning from contaminated drinking water affects 157 million people.[2] And although bright minds exist all over the world, representatives from the developing world have a minimal voice in the international science community. These are some of the issues that catalyzed the formation of Scientifiques Sans Frontières Australia (SSF Australia).

SSF Australia is a science-based charity that seeks to alleviate the imbalance in education, resources, and health in the world. We realized that scientists have unique knowledge and skills, which are lacking from many humanitarian aid programs. We focus on community-identified scientific problems and, therefore, we are not primarily serving the interests of either academia or industry. This is our mission, to provide the scientific link in the humanitarian aid network of nongovernmental organizations (NGOs).

In partnership with Community Waterwatch Australia and Waterkeepers Australia, SSF Australia is helping high school students to learn—in the field—more about their local waterways.

SSF Australia was born in 2005 when some of our founding members attended the Pacifichem 2005 conference in Honolulu. During the conference, many people observed that researchers from developing countries in the Asia Pacific region were under represented. This galvanized us into action with the idea for SSF Australia.

Our drive was, and is, to partner science expertise with communities in need, in a manner that directly addresses the underlying issues and in a not-for-profit capacity. We aim for an organization that allows scientific knowledge and expertise to influence people's lives in a relatively short time frame because there are many areas where scientific skills could be applied.

Our vision is of a world in which every individual and community have adequate access to the scientific resources, knowledge, and technology necessary to meet their self-identified needs.

Initially, we believed our only option for our cause was to go through one of the various scientific institutes already established in Australia, such as the Australian Academy of Science, or, being chemists, the Royal Australian Chemical Institute. However, we quickly realized that these organizations have aims quite different from our own, and we would not obtain the level of support needed. Therefore, we founded a new science-based charity, inspired by the achievements of Engineers without Borders Australia. Fortunately, similar minded people in the USA had started CWB in 2004 <www.chemistswithoutborders.org>. They share many of the same passions and goals that drive us, and so the Australian chapter was formed as CWB Australia. However, as the organization grew, both in membership and programs, we found the name "chemists" was exclusive. Not only that, but we recognized that we needed an interdisciplinary approach to solve our targeted issues. This generated much discussion within the organization, but our final decision was to become Scientists without Borders Australia. In April 2007, we re-branded and re-launched as Scientifiques Sans Frontières Australia.

In our formative stage, we were inspired by the founder of Engineers without Borders Australia, Daniel Almagor. He spoke to us about the need for a paradigm shift within the engineering discipline to enable engineers to become directly linked with communities in need, so their expertise would make a positive contribution toward diminishing suffering and assisting development. SSF Australia dreams of doing the same for the sciences. We want materials scientists to ask themselves if their work can be easily applied in the developing world. We want agricultural scientists

to ask themselves how their knowledge could be of assistance to farmers in drought-prone areas. We want scientists throughout the world to be proud of their achievements, not only on a cerebral level, but because their work satisfies their consciences.

Our vision is of a world in which every individual and community have adequate access to the scientific resources, knowledge, and technology necessary to meet their self-identified needs. SSF Australia envisions a scientific community where the transfer of knowledge and technology is at the forefront of every scientist's mind. Fundamental to this vision is our conviction that each individual has the ability and the responsibility to make a positive impact in the world. Our charter is to work with communities to improve the quality of life of people in the lower echelons. This can be achieved through educating and by implementing customized and sustainable technologies. Also, through the process of helping people, members become more socially aware and responsible. To achieve this, we are engaging with scientific students, professionals, and industry, as well as the broader community.

SSF Australia has four main objectives: assisting the development of international science; integrating science solutions into the community; engaging scientists in ethical discussions and practices; and providing science education to the general community. SSF Australia runs a range of programs that satisfy each of these core goals.

Water Monitoring and Management

Currently, much of Australia is experiencing drought conditions and communities are becoming increasingly concerned about their local waterways. One aspect of the problem is the mismanagement of some important riparian environments. In partnership with Community Waterwatch Australia and Waterkeepers Australia, SSF Australia is helping high school students to learn more about their local waterways. This consists of understanding the ecology and geology of the surrounding landscape, the human impact on that ecology, ways to manage the impact, and environmental restoration. Students not only learn, but work with SSF Australia to put knowledge into action. This enables them to better retain what they have learned, to improve the local environment, and to gain pride in their own community. By putting science into context, students may even be motivated to pursue a scientific career.

Scientific Resources Appeal

One of the largest differences between the developed and developing world is access to resources. To counteract this imbalance, SSF Australia manages a scientific education resource appeal, aimed at collecting and distributing scientific resources to secondary and tertiary education institutions in the Asia-Pacific region. Currently, this effort is focused on supplying textbooks and other educational material, with plans to extend this to scientific equipment and further resources to assist developing world research. This program has developed from our involvement in the Engineers Without Borders Australia's "Guns to Pens" program <www.ewb.org.au>. Donations are always welcome, as long as the resource is up to date and is in good condition.

Scientific Education Program

Education is the key to creating opportunities. Unfortunately, those who are in the greatest need of opportunities are generally those who have the least access to education. This can be due to a variety of reasons; language difficulties, cultural restrictions, and a lack of financial resources are just a few. One of SSF Australia's core objectives is to increase science literacy in the general community, and we are helping to achieve this by providing tutoring in science-related subjects to students from disadvantaged backgrounds. These are run as small workshops once a week.

Professional Development

One of SSF Australia's objectives is to improve the science profession. To reach this goal, we host a seminar and workshop series aimed at informing science students about aspects of science usually missing from a university degree. These cover a range of issues, such as ethics of science, legal and intellectual property topics, negation skills, science and the media, and the relationship of science to politics.

International Scientist Exchange

SSF Australia is dedicated to enhancing research in the developing world. As such, we are developing an

exchange program in the Asia-Pacific region that we hope will enable early-career scientists from leading institutions to essentially trade places with early career-scientists from the developing world. Both parties will benefit from the exchange by receiving exposure to the struggles and strengths of each environment. Mutually beneficial collaborations can be established between parties that otherwise would not meet. We hope such an exchange will increase the skills and access to technology, through collaborations, of scientists in the developing world. We hope that developed-world participants will find increased meaning in their research and will gain unique experiences.

Future projects of SSF Australia are aimed at developing scientific research in the Southeast Asia and Pacific region, as well as increasing the scientific literacy of the indigenous people of Australia.

To achieve our vision, we must engage scientists globally. Concerned scientists must reach out to their communities, companies, professional organizations, and political and international bodies in order to secure a more sustainable future. SSF Australia aims to be a forum for discussion and action by the scientific community. SSF Australia's higher standard of responsibility and care for others must be integrated into the lives of individuals and communities.

SSA's Core Objectives.

SSF Australia seeks to work in partnership with other organizations and believes that collaboration is vital to finding socially, economically, and environmentally sustainable solutions. All of us, through our specialized experience and training, have something exceptional to contribute to the world. So, this is our call to you, please help us use scientific expertise to positively change the whole world. Contact SSF Australia to find out how you can become involved. Join with us on this exciting venture.

An SSF Australia group in Melbourne.

SSF Australia would like to thank the following for their support in the early stages of development: Faculty of Science, University of Melbourne, the Chemistry Education Association Australia, the Royal Australian Chemical Institute, and Chemists without Borders USA.

Concerned scientists must reach out to their communities, companies, professional organizations, and political and international bodies in order to secure a more sustainable future.

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Colin Scholes <cascho@unimelb.edu.au> is the founding president of SSF Australia and is a research fellow in the Cooperative Research Centre for Greenhouse Gas Technologies, University of Melbourne. Glenna Drisko is the education officer of SSF Australia, as well as a founding member. She is also a Ph.D. student under the supervision of Rachel Caruso in the School of Chemistry, University of Melbourne.

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The 28th Latin American Chemical Congress
and
Colegio de Químicos de Puerto Rico's 67th Annual Conference & Exhibition

28th FLAQ Conference

"Bioanalytical and Biochemistry: Their Role in Bioscience and Biotechnology"
SAN JUAN, PUERTO RICO ▪ July 27 to August 2, 2008

Invitation to the Knowledge Convergence Conference for Latin America and the Caribbean Region

This Summer the Colegio de Quimicos de Puerto Rico (CQPR) will host the biennial Congress of the Latin American Federation of Chemical Associations (FLAQ) to be held jointly with the annual PRChem Conference & Exhibition in San Juan. This important chemical and scientific regional conference and exhibition provides a convergence forum where chemical professionals and scientists, from different applied and theoretical fields, can share information, exchange ideas, promote potential collaborations, and showcase recent technological advances. The congress venue will focus on the most current and important topics that impact research performance and productivity in the following platform areas:

- analytical & process analytics
- industrial chemistry
- organic chemistry
- biotechnology & bioanalytical
- environmental/green chemistry
- inorganic chemistry
- biosciences & bioenergy
- chemical education
- physical chemistry
- materials & nanotechnology
- chemical engineering
- forensics chemistry
- spectroscopy & microscopy
- medicinal chemistry
- other topics

Do not miss this important event!

For more information about the Call for Abstracts, visit our websites at **www.flaq2008** or **www.cqpr1941.org**

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Three Decades of IUPAC Initiatives

by N.K. Uberoi and K.V. Sané

As undergraduate science students at Delhi University (DU), we became familiar with IUPAC's role in pure and applied chemistry in the early 1950s. While pursuing graduate studies at Princeton University in the late 1950s, the junior author (KVS) was mesmerized by the chemical demonstrations of the legendary showman, Hubert N. Alyea, who invariably got a standing ovation. Those demonstrations inspired a lifelong affair with the hands-on component of chemical education. Starting in August 1977 as a plenary speaker at the Third International Conference on Chemical Education (ICCE) in Ljublajana, the involvement of KVS with the erstwhile Committee of Teaching of Chemistry (CTC) evolved from an observer status (1977–1980) to serving as India's national representative (1981–1985), to serving as CTC Secretary (1986–1990) and then as CTC Chairman (1991–1995).

The First Decade

When the CTC—under C.N.R. Rao (chairman) and David Waddington (secretary)—realized the urgent need to upgrade student laboratories in developing countries, an action plan was formulated in 1979. Its implementation began at DU under the title, "Locally Produced Low-Cost Equipment (LPLCE) for Teaching of Chemistry." The R&D part was based on local materials and local know-how (see *CI*, 1982, Issue 1, pp.7–12). The field-testing part of the project, catalyzed by generous support from UNESCO, made spectacular progress beginning in the late 1980s. The senior author (NKU) organized the teacher-training component under the auspices of the Center for Professional Development in Higher Education established at DU by the Indian University Grants Commission (UGC). Nearly 100 hands-on workshops were conducted all over the world, in which nearly 6 000 LPLCE items were fabricated by teachers and taken back for use in student laboratories. Complete documentation for the LPLCE project is available in two monographs distributed by UNESCO, the Commonwealth of Learning, the Federation of Asian Chemical Societies (FACS), and other agencies to college/university libraries all over the world.[1]

Assembling and distribution of LPLCE items was entrusted to SWAVLAMBAN (Sanskrit for self-reliance)—a unit managed by a physically challenged young man. BBC Open University made a documentary on the social dimension of the DU project under its series *Survival*, telecast in the United Kingdom and continental Europe.

The Second Decade

The African program initiated in the mid-1990s was one of our more satisfying experiences. Thanks to the cooperation of John Bradley, several workshops were conducted in Southern Africa. The Soil and Plant Analytical Laboratory Network of Africa (SPALNA) carried out a thorough evaluation of LPLCE published under a Belgian Development Assistance program.

After our retirement from DU, we continued our collaboration by providing new inputs to the LPLCE philosophy. To start, LPLCE was christened "Cost-Effective Science Education." The new label provided the multidisciplinary orientation necessary for hands-on environmental education—an emerging area in the 1990s. KVS strengthened the formal aspects of the teacher-training program during his tenure (1996–1998) as the UNESCO-Nehru Professor for Science Capacity Building at the Jawaharlal Nehru Center for Advanced Scientific Research founded in Bangalore by C.N.R. Rao. NKU shifted his attention to the professional development of schoolteachers under the auspices of the DAV College Management Committee with a network of more than 600 schools all over India.

The Third Decade

Thanks to the partnership with Charles Fogliani, the highly successful Royal Australian Chemistry Quiz was tried in DAV schools in 2003. The Indian adaptation, titled RASAYANIKA (Sanskrit for chemistry), was introduced in 2004.[2] The award was chaired by the reputed Indian industrialist G.H. Singhania, who was made an IUPAC fellow in 2006. The award function was held during Chemical Education Week in January 2005, with Peter W. Atkins and Ram S. Lamba as the chief guests. The duo delivered popular lectures for students and held some workshops for teachers. Atkins also inaugurated the Science Education Center, located at one of the DAV schools in East Delhi. The visit of Atkins and Lamba revived the link with the Committee on Chemistry Education (CCE)—the rein-

carnation of CTC—and was coordinated under the IUPAC umbrella of the CCE Flying Chemist Program[3] (see side column).

At DU, IUPAC initiatives have attracted support at all levels. International agencies like the ICSU CTS, UNESCO, British Council and (British) Commonwealth agencies, World Bank, IDRC, UNIFEM, and UN APCTT have supported part of our activities; as did regional agencies like the FACS and COSTED; and national agencies like the Indian UGC, Indian DST and their counterparts in South Asia, and several other developing countries.

Earlier events of the ICCE series—especially in Dublin (1979), Maryland (1981), Lyon (1983), Tokyo (1985), Sao Paulo (1987), Waterloo (1989), York (1991), Bangkok (1992), and Puerto Rico (1994)—provided a platform for dissemination of the LPLCE philosophy and its relevance to the teaching of pure and applied chemistry. Likewise, the many awards received also attest to the global appreciation of the project. These include the Commonwealth Foundation Award (1983), UNESCO's Einstein Silver medal (1994), the Brasted Memorial Award of the Chemical Education Division of ACS (1994), the Rome-based Global Junior Challenge Award (2000), and FACS Citation (Hanoi, 2003).

Conclusion

Any education project remains unfinished until it is able to influence the teaching and learning process at the grassroots level. Educational changes have very high activation energy; therefore, our effort should be regarded as the first lap of a (marathon) relay race in which individuals of one generation hand the baton to the next generation. The authors have succeeded in identifying some enthusiastic chemistry teachers who are willing to take over, and look forward to seeing wonderful results from them in the future.

Notes and References

1. For any LPLCE documents like the two LPLCE monographs, the SPALNA evaluation report, or the BBC Open University CD, please contact <sitah@bol.net.in>.
2. IUPAC Project 2005-003-2-050; Jan–Feb 2006 *CI*, p. 22.
3. IUPAC Project 2005-004-1-050; Jan–Feb 2006 *CI*, p. 24; or <www.iupac.org/standing/cce/FCP.html>.

Krishna V. Sane <sitah@bol.net.in> and N. K. Uberoi <coordinator@mitramandal.org> became IUPAC fellows in 2005.

Goals and Outcomes of the Flying Chemist Program

The aim of the Flying Chemist Program (FCP) is to help emerging countries improve the teaching and learning of chemistry at all levels. In India in 2005, some of FCP's predetermined goals have translated into tangible outcomes:

Goal 1. Assist in the development of curricula and help develop or recommend new assessment tools.

- The manuscript titled "Assessment Techniques and Tools—Recent Advances" was completed for circulation amongst chemistry teachers.

Goal 2. Help develop different approaches to the teaching of chemistry, including hands-on experiences.

- The first round of the e-Quiz competition was held April–September 2006. The second round was held July–November 2007 and included an online component.
- The two FCP workshops ("Ten Great Ideas of Science" by Atkins) and ("Discovery Approach for Student Labs" by Lamba) were a great hit with the audience. To assist teachers in acquiring multidisciplinary skills, two interactive multimedia sample packages are ready for field-testing.
- A prototype mobile table with built-in 12VDC supply and a mini-LPG cylinder has been fabricated. The table should facilitate the task of lecture-demonstrations in schools. The collection of demonstrations (and associated kits) should constitute another publication.
- The booklet *Small is Beautiful*—a comprehensive review of the microscale approach, authored by Peter Towse a decade ago—has been updated describing some recent developments. Also, a home-kit has been designed to accompany the booklet.

Goal 3. Help develop and implement teacher-training programs.

- A vigorous teacher-training program has been launched through a teacher creativity competition in 2006–2007. The e-Quiz competition for students is also underway, as in 2006.

A forum for members and member organizations to share ideas and concerns.
Send your comments by e-mail to <edit.ci@iupac.org>.

Council Round Table Discussions: Actions Arising from Torino

On 10 August 2007, four round table discussions were held for the first time during the General Assembly to allow small groups of Council delegates to debate subjects of mutual interest in a setting conducive to the easy exchange of ideas. A consensus emerged among the 67 participants that IUPAC should assume a leading role in ensuring that 2011 is proclaimed the International Year of Chemistry by the United Nations. Doing so, participants felt, would help IUPAC meet a number of other objectives, including generating publicity, increasing public appreciation of chemistry, encouraging students to pursue chemistry, and increasing interactions and linkages between IUPAC and governments.

The day after the four round table discussions, all the delegates met for the Council meeting. Council delegates who had attended the round tables reported back that the initiative was a worthwhile exercise for initiating and facilitating communication among delegations. The topics of the roundtables were as follows:

- How can we help regions and small countries to have a more effective voice within IUPAC?
- How can we interact more effectively with governments and other decision makers? How can we improve our interactions with industry, other unions, ICSU, UNESCO, etc.?
- How can we attract more students to chemistry? Do we need to modify the curriculum? Can IUPAC play a role?
- How can we increase the global visibility of chemistry, enhance public understanding of chemistry, and improve its public image? How can we improve the visibility and image of IUPAC?

The setting for the round table discussions allowed for numerous exchanges of ideas and suggestions. Many participants were able to exemplify activities carried out locally, and envision how these could be performed in other places or at different levels.

One group stressed that a good way to become involved with IUPAC is to be an active participant in a project, such as the young observers were doing at the General Assembly. The group concluded that this idea should be further promoted and every project should encourage the participation of a member of a small country. The group also discussed ways that IUPAC could support free access to scientific information. One suggestion was to encourage workshops for librarians to enable easy internet access and literature searches of all chemistry resources.

There was a clear consensus in one of the round-table groups that IUPAC needs more interactions with governments and other decision makers in order to broaden knowledge of IUPAC and its role, to increase the visibility of chemistry, to ameliorate its public image, and to attract more students. Participants felt that IUPAC must show governments and decision makers that it can provide a focused approach to problems. IUPAC needs to be more proactive in these areas for the next several years they concluded.

Participants expressed a range of ideas about how IUPAC should establish new ties with governments and other organizations. Some stated that IUPAC must not forget the applied part of its name and that means that the relevance of its activities depends, in part, on closer ties with industry. Others pointed out that the great asset of IUPAC is its objectivity and independence. Therefore, it is in a good position to play a role in establishing ethics involving chemicals.

There was widespread agreement that each potential linkage with a new partner would require different attention and potentially could lead to different outcomes. Potential partners include the ICSU, World Health Organization, UN Environment Programme, national research funding agencies, federations of national chemical societies, industry, and other government agencies and decisionmakers.

Another common theme of the round table discussions was the urgency for IUPAC to improve its communications. Pursuing joint projects with other groups outside chemistry and working to make 2011 the International Year of Chemistry would facilitate this goal.

In its relations with individuals and in particular with young scientists, it was noted that IUPAC is already involved in providing opportunities for committed chemists to meet and share encouraging approaches to the young. The activities of the Committee on Chemistry Education and others that aim to improve public appreciation of chemistry should be helpful in bringing young people into the chemical profession. These efforts involve enhancing the image of chemistry by publicizing its importance and the creative capacity of chemists. Therefore, once again, participants felt that the single most important action for IUPAC in this

regard would be the successful implementation of a year of chemistry.

When the idea of a year of chemistry resonated from all groups as a chance to try something new, the formulation of a proposal for designating 2011 as the International Year of Chemistry become a priority.

The initial strategy planning task group, led by Peter Mahaffy, has made significant progress in producing a clear rationale and objectives for an International Year of Chemistry. It is expected that the year of chemistry will accomplish the following:

- serve as a focal point for activities by national chemical societies, educational institutions, and nongovernmental organizations
- enhance the understanding and appreciation of chemistry among the public
- promote the role of chemistry in contributing to solutions to many global problems
- build capacity by engaging young people with scientific disciplines
- serve as a catalyst for international cooperation.

Following the endorsement by the IUPAC Council, the Union has invited all Adhering Organizations, Associated Organizations, and other chemical societies to help establish an International Year of Chemistry in 2011. Such a designation would create a strategic opportunity to communicate the central importance of chemistry in every facet of modern life. This is a "once in a lifetime" opportunity for national and regional chemical societies, educators, industrial associations, and others to join together to raise the profile of chemistry around the world.

The development of this strategic issue is highly supported by the IUPAC Executive Committee. IUPAC's role in ensuring the proclamation of 2011 as the International Year of Chemistry shall be closely followed and regular updates will be reported.

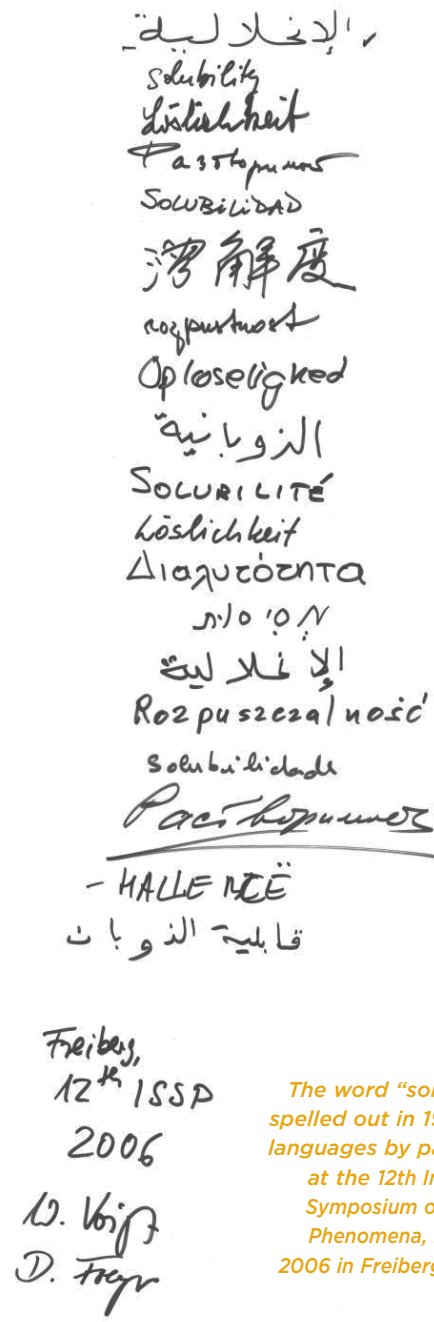
Questions and suggestions can be forwarded to Peter Mahaffy <peter.mahaffy@kingsu.ca>, chair of Committee on Chemistry Education, or John M. Malin <jmalin023@comcast.net>, chair of the IYC strategy planning committee.

See also
www.iupac.org/publications/ci/indexes/tools-of-the-trade.html

Solubility Data Compilations for the Practicing Chemist

by Heinz Gamsjäger, John W. Lorimer, and David G. Shaw

Phenomena related to the solubility of solids, liquids, and gases with one another are of interest to scientists, technologists, and medical practitioners in a wide array of disciplines. Solubility data are, for example, employed to determine thermodynamic quantities, and to predict the safety of radioactive waste repositories as well as to assess the effectiveness of a given pharmacological treatment. Clearly, the end users of solubility concepts and/or solubility data are interested in compilations of data that are critically evaluated by experts, and recommended values that are presented in tables, figures, or fitting equations.



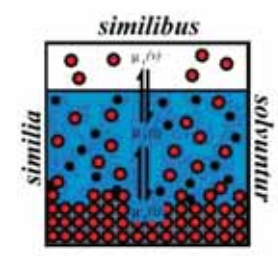
The word "solubility" as spelled out in 19 different languages by participants at the 12th International Symposium on Solubility Phenomena, held in July 2006 in Freiberg, Germany.

One of the major activities of IUPAC is the critical evaluation of physico-chemical data. This includes the Solubility Data Project, a task undertaken by the Subcommittee on Solubility and Equilibrium Data (SSED), a subcommittee of the Division of Analytical Chemistry. The SSED coordinates the dissemination of the evaluated solubility data through traditional (journal) and electronic (internet-accessible database) means. It works with the Analytical Chemistry Division and the U.S. National Institute of Standards and Technology (NIST), the Solubility Data Series publisher, in the selection of chemical systems for treatment. The SSED also encourages the formation of task groups to perform compilation and evaluation and assists task groups in carrying out their projects. The objectives of, and historical details on, the IUPAC Solubility Data Project can be found in a previous issues of *CI*.[1,2]

The ongoing core project of SSED is the publication of exhaustively compiled and critically evaluated reviews of experimental solubility data. The main output of this work is the IUPAC-NIST Solubility Data Series, or simply the SDS. The first 65 volumes of the SDS were published as monographs between 1979–1996. Starting with Volume 66 in 1998, the SDS has on average published two volumes a year in the *Journal of Physical and Chemical Reference Data* (*JPCRD*). The *JPCRD* is a bimonthly journal published jointly by the American Institute of Physics and the NIST with the objective of providing critically evaluated physical and chemical property data, fully documented as to the original sources and the criteria used for evaluation. At the time of this writing the SDS had reached volume 83.[3] Solubility data compiled and evaluated

for the SDS are also available through the IUPAC-NIST Solubility Database.[4]

In addition, since 1984, the subcommittee has organized the popular series of IUPAC-sponsored International Symposia on Solubility Phenomena, abbreviated ISSP, which are held in even-numbered years. These conferences deal with all aspects of solubility and properties of solutions such as thermodynamics, kinetics and general analytical chemistry as applied to theoretical chemistry, industrial processes, the environment, biochemistry, methods of compiling and critically evaluating solubility data, and databases. The most recent conference, the 12th International Symposium on Solubility Phenomena—Including Related Equilibrium Processes, was held from 23–28 July 2006 in Freiberg, Germany.



Plenary and invited lectures presented at these conferences are published in *Pure and Applied Chemistry*.[6] These conferences have become the main scientific event of the solubility community. These symposia accomplish the IUPAC mission of effectively promoting the cooperation of scientists who speak different languages, use different alphabets, and belong to different cultures.[7] This fact is symbolized by the "Rosetta" list of the word "solubility" (page 16) as it is spelled in 19 different languages. The next symposium, the 13th ISSP, will be held 27–31 July 2008 in Dublin, Ireland (see Where 2B & Y, p. 37).

The international cooperation behind the solubility data projects, as well as the solubility symposia, has created quite an ambitious scientific atmosphere. Thus, in addition to the SDS, the SSED has been involved in publishing standard reference texts dealing with solubility phenomena. For example, *The Experimental Determination of Solubilities*,[8] and *Chemicals in the Atmosphere: Solubility, Sources and Reactivity*.[9] IUPAC Recommendations titled "Glossary of Terms Related to Solubility" was recently published in *Pure and Applied Chemistry*.[10] Members of the solubility group have also edited or contributed to several books covering the whole range of development and applications of solubility data and concepts.[11,12,13] It is recommended that those interested in the activities of the solubility data group consult the homepage[14] of the SSED, and the three introductions to the gas/liquid, liquid/liquid and solid/liquid series in particular.[15]

To conclude this review, we emphasize two unconventional "tools of the solubility trade." Each volume of the SDS represents several years of sustained effort by a team of three or more senior scientists. One outcome is the excellent social relations and good friendships that have developed among the members of the solubility group during several decades of scientific cooperation. This friendship guarantees a stable balance between traditional and innovative approaches toward compilation, evaluation, and publication of solubility data. The recruitment of highly qualified young scientists to continue and expand this work requires significant effort from the current participants. The Franzosini Prize, awarded regularly by SSED to a younger scientist contributing to IUPAC's compilation and evaluation of solubility data, is an important recruiting tool.[5]

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15. www.unileoben.ac.at/~IUPAC/samples.html

Water in the Gaza Strip

Malta III attendees unanimously adopted the following communiqué to be addressed to regional and world leaders. The document has been delivered to Tony Blair, envoy to the Middle East working on behalf of the United States, Russia, the United Nations, and the European Union.

Resolution on Water in the Gaza Strip from the Conference on "Frontiers of Chemical Sciences III: Research and Education in the Middle East" (Malta-III)

There are some concerns that transcend politics. Among them are issues that have long-term consequences for civilization and affect the lives of individuals who simply lie in the way of events.

Scientists from the Middle East and the rest of the world, including six Nobel laureates, gathered for the third conference in the series "Frontiers of Chemical Sciences: Research and Education in the Middle East." Among the most important issues discussed was the problem of water.

Water is of central importance to human life; water in the Gaza Strip is of particular concern in terms of quantity and quality, threatening the health of every inhabitant regardless of his or her political inclination.

The scientists at the meeting drafted a resolution in order to draw immediate and urgent attention to this issue. The resolution urges governments to look beyond the present conflicts and disagreements that afflict the region. As with some other treaties, where difficult conflicts are set aside for future consideration, the scientists urge all interested governments and agencies to ignore their current disagreements and, by drawing on scientific expertise, address the issue of water in the Gaza Strip, taking into account the whole cycle from collection to re-use.

This series of meetings continues to bring scientists from Middle Eastern countries and other nations together to discuss common problems and encourage collaborative research in the fields of energy, materials science, natural products, green chemistry, education, and the environment. A full report on the conference will be published in the May–June 2008 *CI*.

www.iupac.org/projects/2006/2006-035-1-020.html

Luis Oro to become EuCheMS President

Professor Luis Oro, past president of the Real Sociedad Española de Quimica, has been elected as president elect of EuCheMS. He will become president in October 2008.

Prof. Oro has made important contributions to the renaissance of chemistry, not only in Spain, through his outstanding scientific contributions, but also through his selfless devotion to the championing and encouragement of chemistry at the European level. He has served as vice president of the European Science Foundation and as a member of the European Science and Technology Assembly, the CREST EU Committee, and the OECD Science Policy Committee. He is also the immediate past president of the Spanish Royal Society of Chemistry, having served as president from 2000 to 2005.

Prof. Oro is a professor of Inorganic Chemistry in Zaragoza and director of the Instituto Universitario de Catálisis Homogénea. His main research interests are in the coordination and organometallic chemistry of platinum group metals, where he has coauthored well over 500 scientific papers on synthesis, reaction mechanisms, and homogeneous catalysis. Professor Oro is a titular member of the IUPAC Inorganic Chemistry Division.

www.euchems.org

President Elect Luis Oro (left) is congratulated by Giovanni Natile, current president of EuCheMS.

On the Environmental Impact of Altered Pesticide Use on Transgenic Crops

by Gijs A. Kleter

Modern biotechnology has enabled the introduction of "foreign" genes into crop plants, leading to the creation of "transgenic" plants and providing a new method for conveying properties of interest to plants. Since the first large-scale introduction of transgenic crops a little more than 10 years ago, the area planted with these crops has been steadily growing, reaching 102 million hectares in 2006. Most of these plants are crops of high economic value and carry either one or both of two traits: herbicide resistance and insect resistance. Popular examples of these transgenic crops are glyphosate (herbicide)-resistant soy and corn borer (insect)-resistant maize.

Herbicide resistance allows for over-the-top application of herbicides (weed killers), contrary to the need to apply other herbicides to the soil as a preventive measure. In addition, herbicide resistance provides an alternative to mechanical weed removal, such as plowing, in areas where minimum tillage is practiced. Adoption of herbicide resistant crops is likely to change the use of herbicides on a particular crop, perhaps leading to an increase in use of the associated herbicide. Insect resistance in crops, on the other hand, is likely to reduce the use of externally applied pesticides.

Currently, there is a trend toward sustainable agriculture. Therefore, the question is what is the environmental impact from changes in pesticide usage on transgenic crops. Various sources have reported the changes in pesticide quantities used on transgenic crops as compared to conventional crops. Pesticides have different environmental profiles, such as dose-response relationships in toxicity and environmental dissemination and persistence. The changes in quantities of pesticides used should, therefore, be put into perspective in order to assess the potential environmental impact of these changes.

From 2002 until 2007, IUPAC has sponsored a project called Impact of Transgenic Crops on the Use of Agrochemicals and the Environment (2001-024-2-600). During the project, data have been collected on the quantities of pesticide used on transgenic crops and on conventional crops. These data have been obtained from various sources, particularly from reports by institutions that regularly carry out surveys, such as the National Center for Food and Agricultural Policy (NCFAP) and the United States Department of Agriculture. In addition, data have been collected, when available, on the associated environmental impacts of these pesticides. The project team has also applied a universal environmental indicator for pesticide use (i.e., the environmental impact quotient [EIQ]).

The outcomes of these studies have been published in three peer-reviewed journal articles and in various contributions to conference proceedings. (See reference list below.) In addition, the results of the project have also been disseminated through conference presentations and an evening seminar at the IUPAC-JSPS pesticide congress in Kobe, Japan, in August 2006.

It is also worth mentioning that the work of a Canadian member of the project received widespread media attention, including a radio interview. His inventory showed that between 1996–2000, herbicide use on Canadian canola substantially changed, concomitant with the introduction of three herbicide-resistant types of canola, of which two are transgenic and one conventional. The results show that the change towards the herbicides used on herbicide-resistant crops has led to a substantial decrease (i.e., by 36.8 percent) in the EIQ.

The team has also applied the EIQ to NCFAP data on pesticides used on transgenic crops and the alternatives applied to conventional crops, including soy, maize, cotton, and canola, in the USA for different years. In particular, the data on herbicides used on herbicide-resistant crops are relatively detailed, including alternative herbicide programs adapted to each American state. The outcomes for the various years are consistent in that they show, in general, that quantities and environmental impacts from pesticides applied to transgenic crops are reduced. Interestingly,

conventional herbicides, particularly modern, low-rate herbicides, occasionally show a favorable environmental impact as well. In addition, the data also show a shift toward certain pesticides, in particular to glyphosate in glyphosate-resistant soy at the expense of other conventional herbicides.

Cotton is a crop that typically receives multiple pesticide sprays each season. Interestingly, insect resistance not only reduces the number of sprays towards certain target insects, but also saves non-target beneficial insects, such as predators of other pests. Insect-resistant cotton, therefore, lends itself to incorporation into integrated pest management programs.

A prospective study has considered the potential implications of the adoption of glyphosate-resistant crops in Europe, where limited adoption has taken place so far. The data in general show that reductions in quantities of herbicides applied to beets and canola can be achieved, although soy may require slightly more herbicide. The environmental consequences of the herbicide used on glyphosate-resistant crops are similar to, or less negative than, those of herbicides applied to conventional crops, depending on the parameters considered or the method used for prediction.

In conclusion, the review of collected data and calculations performed by the team show that, in general, adoption of herbicide- and insect-resistant crops lead to less environmental impacts from pesticides applied to these crops. This conclusion is relevant to both risk assessment of transgenic crops and the pesticides applied to them, as well as to risk policy regarding the adoption of these crops. In a follow-up project sponsored by IUPAC, the investigations will focus on the consequences of altered pesticide use on pesticide residues on transgenic crops, particularly with respect to the impact on regulatory issues and consumer exposure to pesticides, shifting the focus from the environment to consumption.

The task group members were as follows: Raj Bhula, Kevin Bodnaruk, Elizabeth Carazo, Allan S Felsot, Caroline Harris, Arata Katayama, Harry Kuiper, Kenneth D. Racke, Baruch Rubin, Yehuda Shevah, Gerald R. Stephenson, Keiji Tanaka, John Unsworth, Don Wauchope, and Sue-Sun Wong. Gijs Kleter was the chair.

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www.iupac.org/projects/2001/2001-024-2-600.html

Future Energy: Improved, Sustainable, and Clean Options for Our Planet

by Trevor Letcher

Current debates about energy policy involve two key issues, fuel shortages (oil, coal and gas) and atmospheric pollution resulting from the burning of that oil, coal and gas—both of these are chemical issues.

We have the technical know-how to use less energy per capita and retain a reasonable standard of living, but we do not appear to have the will to implement such a plan. The public is either not convinced of the need to reduce energy usage, too lazy, or just plain greedy. Governments are aware of energy problems, such as "the peaking of oil reserves," but still they do not enforce energy saving actions and only pay lip-service to them. One can only assume that the huge tax revenues and profits from oil and gas stocks and shares overwhelms their sense of duty. Oil companies

are now so large (5 of the largest 10 companies in the world are oil companies) that they appear to be more powerful than state governments.

The objective of this new IUPAC project is to publish a book that first considers the reasons for developing alternate forms of energy and then details all the possible forms available to us. Each chapter of the book will be written by an engineer or scientist working in the field.

Each of the book's 22 chapters will detail a form of energy that will be available to us, globally, over the next few decades. The review will focus on all types of energy available to us, taking into account our major problems: reducing our dependence on fossil fuel, reducing the amount of carbon dioxide we produce, and finding a suitable fuel for our transportation system.

The book will be unique among available titles in the same genre because each chapter will be written by a scientist or engineer who is an expert in his or her field. Each chapter highlights the details, scope, and problems associated with a particular type of energy. New and emerging forms of energy will be covered, including wave power, tidal energy, recent developments in battery and fuel cell technology, the hydrogen economy, tar sands, wind energy, solar (concentrated), solar (photovoltaic), and geothermal. However, old forms of energy will not be forgotten and there will be chapters on the latest improvements in coal burning, oil and gas burning, oil from coal and methane technology, bio-fuels, carbon dioxide capture and storage, hydroelectric power, and nuclear fission. Areas of great potential that have not yet come of age, such as pebble bed nuclear reactors, methane gas hydrates, energy storage, and nuclear fusion, are also dealt with. Looking at the whole spectrum of options in the book, it should be possible to discern which forms of energy best suite us now and in the future.

This book is part of the education process needed to boost public appreciation and understanding of science. It will present a non-political and unemotional set of solutions to the problems facing us—and it will offer a way forward. We hope that the book will be of interest to students, teachers, and professors and researchers of new energy, as well as politicians, government decision makers, captains of industry, corporate leaders, journalists, and editors.

For more information, contact the Task Group Chair Trevor Letcher <trevor@letcher.eclipse.co.uk>.

www.iupac.org/projects/2007/2007-015-2-100.html

Green Book: Abridged Version

The new project "Green Book: Abridged Version" aims at creating a condensed version of the third edition of the *Green Book—Quantities, Units, and Symbols in Physical Chemistry**—that will consist of only 40 to 50 pages and be more suitable for university teaching and continuing education in an industrial context. The project aims to support the typical contents of physical chemistry at the university level by restricting the range of topics covered in the Green Book to those that are most important for students: general chemistry, thermodynamics, kinetics, spectroscopy, and basic physics. This "light" version of the Green Book will focus on examples of best practices in the use of terminology, quantities, and units and their symbols and will be made available both as printed material and via the Web.

*www.iupac.org/publications/books/author/cohen.html

For more information and comments, please contact Task Group Chairperson Roberto Marquardt <roberto.marquardt@chimie.u-strasbg.fr>.

www.iupac.org/projects/2007/2007-032-1-100.html

Postgraduate Course in Polymer Science

The 12th and 13th runs of this course will be held in the academic years 2007–2008 and 2008–2009 at the Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, in Prague. The courses are sponsored by UNESCO with minor financial assistance from the Academy of Sciences of the Czech Republic. The institute, with more than 100 scientists and offering more than 40 years of experience in postgraduate education, offers up-to-date facilities

for postgraduate training in polymer science.

Between 5 and 13 students have participated in the 11 sessions of the course that have been so far completed, with the number of students varying based on the funds that have been available. The course lasts 10 months and comprises about 50 hours of lectures in modern polymer science, including an introduction to the nomenclature and terminology recommended by IUPAC, experimental work on research projects under the supervision of senior scientists of the institute, and participation in all educational activities within the institute. The results of the research are published in international technical journals and presented at meetings. All told, the course has had 85 participants and boasts 119 papers published in international journals and 167 communications at international meetings.

This project is supported by IUPAC and is intended to enable young university graduates and Ph.D.s from countries with limited research facilities to acquire knowledge on recent advances in polymer science and given them the professional skills needed for to promote polymer science in their home countries.

For detailed information on the course, see www.imc.cas.cz/en/imc/unesco.html.

For more information and comments, please contact Task Group Chairperson Pavel Kratochvíl <krat@imc.cas.cz>.

www.iupac.org/projects/2007/2007-049-1-400.html

Chemical Issues in Biomass Burning in Sub-Saharan Africa

A new project, endorsed by the IUPAC Subcommittee on Green Chemistry, proposes the preparation of a collaborative book exploring all the aspects relevant to biomass burning in sub-Saharan Africa, with special focus on the chemistry aspects.

Biomass burning implies emission of combustion products into the air (including greenhouse gases) and the waste/loss of biomass that could be utilized as valuable material resource. The extent of biomass burning in sub-Saharan Africa, and the complexity of the aspects involved, constitutes an important motivation to view it as a problem deserving priority attention and careful multisided investigation at the subcontinental level.

Chemistry can have multisided roles in its investigation, including:

- evaluation of the emission of combustion products into the air, and the comparison of its extent with that of other pollution sources, to view the problem within a comprehensive picture of pollution-generating activities
- analysis of the impact on the humus composition and properties, an evaluation of actual or expected benefits, and the search for ways to ensure that any actual benefit will not be lost within alternative options
- estimation of the waste/loss of biomass
- design of alternative options and the estimation of their expected benefits and impacts

Important contributions to the understanding of the various aspects of the problem, and of the interconnections between them, can be expected from professional interactions between chemists and other specialists. It will be important for a variety of specialists to be involved, including:

- specialists in agriculture, because biomass-burning is extensively practiced in areas devoted to agriculture; therefore, the design of viable alternative options has to consider agriculture-related needs, with particular attention to subsistence agriculture
- specialists in forestry, because the needs of forests and reforestation initiatives may be different from those of areas devoted to agriculture
- meteorologists, for the consideration and estimation of the impact, on climate, of the emissions from biomass burning

Bush Fires in Southern Mozambique. Winter is the dry season in southern Africa and fires are set to hasten the greening of the grass shoots for cattle grazing. Source: Image Science and Analysis Laboratory, NASA-Johnson Space Center.

- specialists in chemical education and education in general, to design effective ways of acquainting students with all the aspects of the problem
- specialists in territorial economy and communities studies, to evaluate the territorial contexts in which and purposes for which biomass burning is practiced, to identify optimal time and hierarchy sequences for its replacement with alternative options (targeting firstly contexts other than subsistence agriculture), and to participate in the design of options for subsistence agriculture that will not penalize it, but will be to its advantage
- specialists in fostering community participation, because any alternatives to existing practices need to be presented to communities in an informative way that helps to gain their consent; and because interesting suggestions for alternative options might come from communities

The proposed book is meant as a resource offering new insights on the issue of biomass burning in sub-Saharan Africa. It will include contributions from different countries in the region and will be prepared in such a way as to be accessible to students. Given the envisaged characteristics of the book, the contributions are not expected to duplicate research articles as published in research journals. Rather, they are expected to utilize research outcomes to explore:

- relationships between outcomes of different individual research (including comparisons and other investigations relevant to a better understanding of the subcontinental nature of the problem)
- possible alternative options to the current practice of biomass burning, taking simultaneously into account the needs of the environment and the need that subsistence agriculture be sustainable
- the role of chemistry and chemists in designing alternative options, predicting their impacts, and proposing/designing their implementation

By proposing to attract attention and disseminate information on the chemical aspects related to biomass burning and to the search for viable alternative options, the planned book is in line with green chemistry objectives and attitudes, above all in terms of pollution prevention (avoidance of the emission of gases, particles, and heat into the atmosphere) and economy-sound utilization of renewable resources (maximization of the products/benefits that can be obtained from biomass through options that are not purely destructive).

Finally, the book is also meant to serve as a prototype/model for analogous projects focusing on problems identified as "priority ones" for other groups of countries, subcontinents, or continents. Projects of this type would have a common set of motivations and objectives:

- selecting a problem that is of particular relevance for a large area
- highlighting the aspects that are common to the whole area
- devoting special attention to the chemical aspects of the problem and to the roles of chemistry in designing options to address the problem and ways of implementing them

This envisaged prototype role adds to the challenges of the project and to the motivations for pursuing quality in its realization, and expands its potential significance.

For more information and comments, please contact Task Group Chairperson Liliana Mammino <liliana@univen.ac.za>.

www.iupac.org/projects/2007/2007-025-1-300.html

Green Chemistry, Sustainable Development, and Social Responsibility of Scientists

The more than 3 000 chemists who came to Moscow in September this year to participate in the XVIII Mendeleyev Congress on General and Applied Chemistry had a chance to enjoy a true Indian summer—in Russia, known as a "woman's summer." The Congress was held in the headquarters of the Russian Academy of Sciences, situated in the green, southwest part of the city, not far from the bank of the Moskva river. From there, participants could enjoy the colors of the turning leaves, which seemed to emphasize the beauty of nature and our role in protecting it. So it was only fitting that during the congress, the international symposium on Green Chemistry, Sustainable Development, and Social Responsibility of Scientists took place.

The symposium was financially supported by the Russian Academy of Sciences, IUPAC, OPCW, the European Commission (through the Russian Regional Environmental Centre), and the Institute of Chemistry and the Problems of Sustainable Development at D. Mendeleyev Univ. of Chemical Technology of Russia.

The symposium had several goals:

- disseminating new educational materials related to responsible stewardship, and showing the necessity and practicality of including "green" chemistry principles in chemical education
- emphasizing the social responsibility of scientists in promoting sustainable development, both in developed and developing countries
- promoting all aspects of chemistry, not just among the members of the profession but, increasingly, to the worldwide community, and contributing to the public's understanding of chemistry.

Undoubtedly, the symposium has helped to facilitate the exchange of information among scientists, educators, and decision makers; helped promote awareness about the Chemical Weapons Convention (CWC) and its implementation in the scientific community; and has provided additional impetus to developing a culture of responsibility within the scientific community and encouraging compliance with international norms, including the CWC.

Chemistry plays a critical role in sustainable development because progress of new technologies is inextricably tied to the progress of modern civilization. We live in a world completely grounded on chemistry: everything that we are and do is controlled by chemistry. Fortunately, there are many chemical educators, well trained in environmental issues, who would like to take the next step and contribute to the development of education related to sustainable development, as was evidenced at this symposium.

The symposium featured presentations from more than 120 speakers from academia, international organizations, research organizations, and chemical companies from Russian and the Commonwealth of Independent States as well as from Australia, Canada, Great Britain, Italy, and the United States. The presentations addressed several themes:

- practical applications of green chemistry in scientific research and practice
- introduction of principles of green chemistry into classical chemical education
- the risks and safety of chemical processes, and the safe destruction of chemical weapons
- environmental management and the social responsibility of professional chemists
- environmental education as a part of education for sustainable development

In the opening session, Pietro Tundo, Valery Petrosyan, Peter Mahaffy, and Mary Kirchhoff each made clear presentations describing the challenges and opportunities of green chemistry. In the technical sessions, the key themes of the symposium were discussed in depth. In fact, the presentation made by E. A. Mamontova (Institute of Geochemistry of SB of RAS, Irkutsk, Russia), entitled "The Problem of POPs in Lake Baikal and the Lake Baikal Region," generated such a great number of questions concerning the responsibility of chemists for environmental risks that the chairs of the session had to limit the questions.

Two poster prizes were awarded at the symposium recognizing young chemists:

- "The Synthesis of Extended Porphyrins in Aqueous Microemulsions," by S. Chernov, A. Cheprakov, and I. Beletskaya, Chemistry Department, Moscow State University, Moscow, Russia
- "Synthesis of Alkoxysilylated Humic Derivatives and Their Immobilization Onto Mineral Surfaces," by L.A. Karpiouk, I.V. Perminova, S.A. Ponomarenko, and A.M. Muzafarov.

Much of the discussion during the symposium centered on the following topics:

- the necessity of introducing the principles and methods of "green" chemistry into chemical education, both at the university and the high school level
- the role of chemical education in understanding global environmental problems
- the movement from environmental education to education for sustainable development
- the safe destruction of chemical weapons
- opportunities for the resolution of regional environmental problems by methods of "green" chemistry
- legal questions of environmental management and the social responsibility of chemists

- the search for new chemical methods and recipes of for "green" chemistry processes that can help solve environmental problems and help in the safe destruction of chemical weapons

The following recommendations emerged from the symposium:

- chemists should work together in a spirit of humanism and tolerance to help achieve sustainable development, and that ethical principles guiding the professional work of chemists should be outlined in a code of conduct
- principles of green chemistry should be used in scientific research and brought into industrial development
- principles of sustainable development and green chemistry and should be introduced into chemical education at the grade school, high school, and university levels
- education related to sustainable development should include chemical education as a way of adequately understanding the processes taking place in the environment
- "green" chemistry methods should be used to create new, safe technologies for the destruction of chemical weapons
- the fundamental principles of chemical education should be preserved, and that they should be connected with the problems of sustainable development (i.e., environmental problems, problems of energy and resource conservation , and the social and ethics aspects of development)
- M.V. Lomonosov Moscow State University's initiative to organize the second International IUPAC Conference on green chemistry should be supported

For detailed information on the congress, see <www.chemend.ru>.

For more information and comments, please contact Task Group Chairperson Natalia Tarasova <nptar@online.ru>.

www.iupac.org/projects/2006/2006-043-3-050.html

Provisional Recommendations

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.

www.iupac.org/reports/provisional

Glossary of Terms Used in Pharmaceutics

This Glossary of Terms in Pharmaceutics is needed by practitioners in the field of pharmaceutics—a field that fulfills an important and crucial role, different from the roles of other scientific disciplines involved in the drug-making process. The glossary contains 156 definitions used in pharmaceutics. These are related to various aspects of this discipline such as 1) physicochemical characterization of pharmaceutical preparations and the active ingredients they contain; 2) unit operations used in the practice of pharmaceutics; 3) terms related to the various dosage forms; 4) terms related to the various modes and routes of drug delivery; and 5) terms used in pharmacokinetics and biopharmaceutics in general, and additional miscellaneous terms. Since the field of pharmaceutics is multidisciplinary, with practitioners from a variety of fields such as chemistry or various biological sciences, a glossary containing authoritative definitions would be useful to them. The terms used in pharmaceutics are rarely covered by existing glossaries, and in cases were they are, their definitions are often inappropriate for the field of pharmaceutics and require new or modified definitions to better fit the new context.

Comments by 30 April 2008

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www.iupac.org/reports/provisional/abstract07/breuer_300408.html

Explanatory Glossary of Terms Used in Expression of Relative Isotope Ratios and Gas Ratios

To minimize confusion in the expression of measurements of isotope and gas ratios, a glossary based on recommendation by the Commission on Isotopic Abundances and Atomic Weights of the IUPAC is presented. Entries in the glossary are consistent with the SI system of units or with recommendations of the Commission. The recommendations presented herein are designed to clarify expression of quantities related to measurement of isotope and gas ratios by ensuring that quantity equations and not numerical-value equations are used to define quantities. Examples of column headings consistent with SI recommendations and examples of various deprecated usages connected with the terms recommended are presented herein.

Comments by 31 May 2008

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www.iupac.org/reports/provisional/abstract08/coplen_310508.html

Glossary of Class Names of Polymers Based on Chemical Structure and Molecular Architecture

This document defines class names of polymers based on the class names of starting monomers and characteristic features of the chemical constitution of polymer molecules (macromolecules), i.e., class names that have gained general acceptance in the polymer and material literature, science and technology as well as in public.

The glossary is divided into three parts:

- Source-based class names, which identify common classes of starting monomers such as “acrylic”, “diene”, “phenolic”, “vinylic”.
- Class names based on chemical structure, which identify characteristic groups in the main chains (backbones) of the polymer molecules such as (i) inter-unit groups derived from functional groups, e.g., “amide”, “ester”, “ether”; (ii) a specific group of atoms, e.g., “alkenylene”, “siloxane”, “sulfone”; (iii) ring structures, e.g., “benzimidazole”, “benzoxazole”, “quinoxaline”.
- Class names based on molecular architecture, which identify mainly the overall shapes of polymer molecules through the type of their graphical representation such as “linear”, “branched”, “dendritic”, “comb”.

Each part of the glossary is arranged in a non-hierarchical alphabetical order. Each entry provides: a) the polymer class name; b) its definition; c) specific or generic examples including IUPAC names and a structure or graphical representation; d) relations to other polymer classes and subclasses; e) notes on the inclusion or exclusion of borderline cases. Alphabetical index of all class names is included.

Comments by 30 June 2008

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www.iupac.org/reports/provisional/abstract08/vohlidal_300608.html

Making an imPACt

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

Acetonitrile: Ternary and Quaternary Systems

Valerii P. Sazonov, David G. Shaw, Adam Skrzecz, and Nikolai I. Lisov, Nikolai V. Sazonov

IUPAC-NIST Solubility Data Series. 83
Journal of Physical and Chemical Reference Data, Vol. 36, No. 3, pp. 733-1131, 2007
doi: 10.1063/1.2539811

The mutual solubility and liquid-liquid equilibria of acetonitrile ternary and quaternary systems with liquid solvents are reviewed in this document. The solvents include water, inorganic compounds, and a variety of organic compounds such as hydrocarbons, halogenated hydrocarbons, alcohols, acids, esters, and nitrogen compounds. A total of 191 ternary and 35 quaternary systems, whose properties were described in the chemical literature through 2000, are compiled. For 37 systems sufficient data were available to allow critical evaluation. All data are expressed as mass % and mole fractions as well as the originally reported units. Similar reviews of gas, liquid, and solid solubilities for other systems were published earlier in the International Union of Pure and Applied Chemistry Solubility Data Series. This is Volume 83 of the series.

www.iupac.org/publications/sds/2007/83_abstract.html

Band Broadening Function in Size Exclusion Chromatography of Polymers

Gregorio Meira, Milos Netopilík, Martin Potschka, Irene Schnöll-Bitai, Jorge Vega

Macromolecular Symposia 2007, 258, 186–197
doi: 10.1002/masy.200751221

This article reviews some recent developments on the determination of the Band Broadening Function (BBF) in Size Exclusion Chromatography (SEC) of polymers. The correction for band broadening (BB) is important for quantitative determinations of the molar mass distribution (MMD) of narrow-distributed (or highly multimodal) polymers, and of derived variables such as kinetic parameters. In the narrow range of a molar mass standard, the BBF is uniform and of positive skewness. In a broad chromatographic range, the BBF is non-uniform and skewed; and it can be adequately represented by an exponentially-modified Gaussian function (EMG) of 2 parameters that vary slightly with elution volume: an increasing Gaussian variance and a decreasing exponential decay. Additionally, the total BBF variance remains almost constant if not close to the total exclusion limit. The following methods for determining BBF parameters are reviewed: a) a direct method based on assuming Poisson-distributed MMDs; b) a direct method based on measuring the mass- and molar mass chromatograms of narrow standards; c) a theoretical method based on a stochastic model that is equivalent to the Gidding-s-Eyring model; and d) a theoretical method based on a deterministic model obtained through an extension of the classical van Deemter expression. Ideally, the correction for BB requires a robust numerical inversion algorithm. However, alternative simplified solutions are also possible.

This article is the final report of the IUPAC project 2003-023-2-400.

www.iupac.org/projects/2003/2003-023-2-400.html

Green-Sustainable Chemistry

Pure and Applied Chemistry, Vol. 79, No. 11, November 2007, Special Issue (pp. 1831–2100)
foreword by James R. Bull
preface (reproduced in part below) by Pietro Tundo

This Special Topic Issue on green chemistry is a continuation of the Special Topic Issue published in July 2000. The articles have been selected (with great difficulty) from the massive, valuable scientific contributions on green chemistry made by numerous professors and researchers during the first International IUPAC Conference on Green-Sustainable Chemistry, held 10–15 September 2006 (for more details on the conference, see May-June 2007 *CI*).

The topics included in this volume were chosen to appeal to industrial researchers and representatives, colleagues from universities, and politicians and students who are interested in green and sustainable chemistry. Topics include:

- benign syntheses routes (heterogeneous catalysis, new reagents, and catalysis for degradation of pollutants)
- benign process technology (microwave technology, photochemistry, and new regulation devices)
- use of renewable sources (starch, cellulose, sugar, new detergents, and biomass technology)
- future green energy sources (hydrogen technology, fuel cell technology, and biodiesel)

All of the articles point out a general need for novel green processes and recommend that process and product evaluations include environmental and health considerations (Sept.-Oct. 2007 *CI*). To accomplish that, more basic research on chemical reactions related to green chemistry is essential. Our knowledge in this area is far from complete.

Recently, in fact, the difference between sustainable chemistry and green chemistry is becoming more evident. Sustainable chemistry envisions industrial processes that create better products, result in fewer pollutants, and are profitable. Green chemistry, in contrast, is more innovative. It deals with the fundamental aspects of chemistry without regard for industrial processes or profitability. Either way round, over time, it will become more and more necessary to create a new type of chemistry that utilizes greener production methods, involves cleaner chemical derivatives, and addresses some of the ethical issues related to environmental responsibility. This special issue of *PAC* addresses this need.

www.iupac.org/publications/pac/79/11/

Biophysico-Chemical Processes of Heavy Metals and Metalloids in Soil Environments

edited by A. Violante, P.M. Huang, and G.M. Gadd
John Wiley & Sons, 2007 [ISBN 978-0-471-73778-0]

Written by a multidisciplinary group of soil and environmental scientists, Biophysico-Chemical Processes of Heavy Metals and Metalloids in Soil Environments provides the scientific community with a critical qualitative and quantitative review of the fundamentals of the processes of pollutants in soil environments. The book covers pollutants' speciation, mobility, bioavailability and toxicity, and impacts on the development of innovative restoration strategies for polluted soils.

The book is the output of IUPAC project 2004-003-3-600. It is also the first volume to be published in a new series entitled "Biophysico-Chemical Processes in Environmental Systems" to be published by John Wiley & Sons (Hoboken, N.J.). The second volume will be the outcome of IUPAC project 2006-014-1-600, entitled "Biophysico-Chemical Processes Involving Natural Nonliving Organic Matter in Environmental Systems."

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

Functional and Biological Gels and Networks: Theory and Experiment

Macromolecular Symposia, Vol. 256
WILEY-VCH Verlag GmbH, 2007
edited by J. Stanford

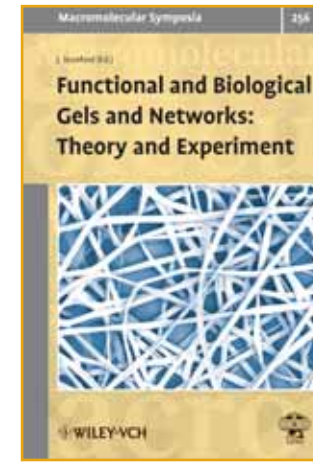
Polymer Networks 2006, the 18th International Polymer Networks Group Meeting, was held in Sheffield, UK from 3–7 September 2006. The conference was organized by the Sheffield Polymer Centre at the University of Sheffield under the cochairmanship of John Stanford (University of Manchester), Tony Ryan (University of Sheffield), and Simon Ross-Murphy (Kings College, London). The conference was sponsored by IUPAC's Polymer Division.

At the conference, macromolecular and biological science experts from a variety of disciplines presented the latest research on functional and biological gels and networks, hitting topics that crossed the boundaries between synthetic, biological, and physical gels and networks. Topics included:

- the chemistry, processing, structure, and properties of synthetic elastomers
- the molecular and supramolecular characterization of gels and networks
- theory and modeling of gelation and network formation
- nanostructured gels and network nanocomposites as high-performance engineering materials
- biological and physical gels and networks with applications in the biomedical field, in drug releases, in cosmetics, and in the food industry

This special volume of Macromolecular Symposia contains selected papers from the conference and is divided into five parts that reflect the themes of the conference program:

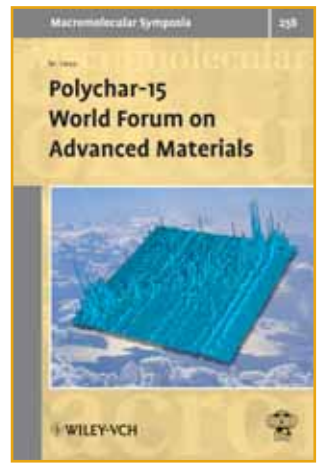
- statistical studies on networks
- processing-structure-properties of networks
- scattering from gels and networks
- nanostructured gels and networks
- physical and biological gels



www.iupac.org/publications/macro/2007/256_preface.html

Polychar-15 World Forum on Advanced Materials

Macromolecular Symposia, Vol. 258
WILEY-VCH Verlag GmbH, 2007
edited by M. Hess



Polychar, the World Forum for Advanced Materials, was held in Buzios, Brazil, in 2007—and, naturally enough, focused on polymer science on the South American continent. Since 2004, Polychar has been held in different locations around the globe, helping to ensure that the widest variety of participants can attend and that important new research worldwide is presented.

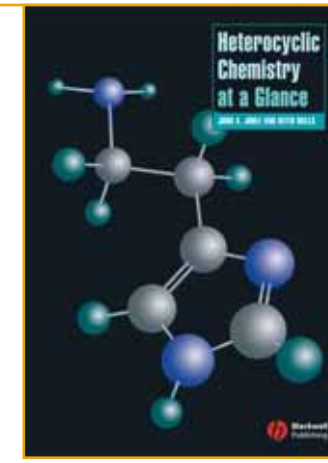
A range of original research and reviews related to advanced materials were presented at the conference, and highlights are included in this volume. In addition, at the conference, the Paul J. Flory Research Award (ex aequo) was presented to Prof. Eloisa Mano, Universidade Federal do Rio de Janeiro, Brazil, and Prof. Jean-Marc Saiter, Universite de Rouen, Rouen, France. In addition, the International Materials Research Award was presented to Prof. Dusan Berek, Slovak Academy of Sciences, Bratislava, Slovakia.

www.iupac.org/publications/macro/2007/258_preface.html

Heterocyclic Chemistry at a Glance

John A. Joule and Keith Mills
Blackwell Publishing 2007
ISBN: 9781405139182

reviewed by David StC. Black



Heterocyclic Chemistry at a Glance is another book from the "at-a-glance" series, and is designed to provide an introduction to heterocyclic chemistry. It assumes a basic knowledge of organic chemistry and is suitable for a third-year-level course in a typical British-style undergraduate chemistry program. It covers the most important aspects and principles of heterocyclic chemistry, and explains the importance of this area of chemistry.

The material is described in 18 fairly brief sections; however, each section provides citations to more detailed explanations in *Heterocyclic Chemistry*, also by the authors. The first three sections cover aspects of nomenclature, structure, and common reaction types. Sections 4 through 12 cover the various heterocyclic ring systems, dealing with pyridines, quinolines and isoquinolines, diazines, pyryliums and benzopyryliums, pyrroles, indoles, furans and thiophenes, 1,3-azoles and 1,2-azoles, and purines. This layout reflects the fact that six-membered ring systems with one heteroatom are followed by those with two (the diazines), then five-membered ring systems with one heteroatom are followed by those with two (the 1,3- and 1,2-azoles), and finally the purines have two heteroatoms in each of a six- and five-membered ring. Section 13 describes the higher azoles and azines, where there are more than two heteroatoms. Heterocyclic systems incorporating a bridgehead nitrogen (indolizines, azaindolizines, and heteropyrrolizines) are described in section 14.

While the book is mainly about aromatic heterocycles, section 15 makes the point that there are many nonaromatic heterocyclic ring systems that are quite interesting, but whose chemistry is unexceptional when compared with that of related alicyclic compounds. In section 16 there is a shift to a consideration of palladium catalyzed reactions in heterocyclic chemistry. Although this material might seem out of place, the discussion makes sense here because of the ubiquity of such reactions, and also because of their very special utility for heterocyclic compounds, where many of the classical reactions that work for alicyclic compounds fail.

The last two sections, 17 and 18, are interesting for their descriptions of heterocycles in biochemistry and medicine, respectively. These chapters indicate the importance of heterocyclic chemistry in the life cycle, and why most chemistry graduates who go into industry end up working with heterocyclic compounds.

It is important to teach heterocyclic chemistry at the undergraduate level for chemistry majors and students who gravitate towards biology, but these students do not need to cover the subject in depth. This book provides an excellent overview of the subject in accessible language that avoids unnecessary detail. In addition, the examples, schemes, equations, and structures are well chosen. The book clearly explains typical reaction conditions; it does not include specific experimental detail or references. This is an ideal textbook for any undergraduate course on heterocyclic chemistry.

www.blackwellpublishing.com

David Black <D.Black@unsw.edu.au> is a professor of organic chemistry at the University of New South Wales, Sydney, Australia. He cochaired the 21st International Congress of Heterocyclic Chemistry in July 2007 in Sydney, and is secretary general of IUPAC.

Compendi De Nomenclatura De Química Analitica

The Orange Book in Catalan

Versio catalana de la tercera edició anglesa a cura d'Elisabeth Bosch i Salvador Alegret. Catedratics de Quimica Analitica, dela Universitat de Barcelona I de la Universitat Autonoma de Barcelona, respectivament, I members de la Societat Catalana de Quimica. Barcelona, Spain (2007), ISBN 978-84-7283-870-3.

[Catalan translation of IUPAC "Orange Book," *Compendium of Analytical Nomenclature* (definitive rules 1997), 3rd edition. Prepared for publication by J. Inczedy, T. Lengyel, and A.M. Ure. Blackwell Science, 1998, ISBN 0-86542-6155.]

Greenhouse Gases: Mitigation and Utilization

CHEMRAWN XVII, Part II: Sequestration and Mitigation Strategies

by John Malin

This is the second part of a conference report on the **CHEMRAWN XVII Conference on Greenhouse Gases: Mitigation and Utilization**, held 8–12 July 2007 at Queens University in Ontario, Canada. The first part of this conference report (Jan.–Feb. 2008 *CI*, p.35) covered policy issues and strategies. This article covers the sequestration of greenhouse gases (GHG) and their mitigation and utilization.

The essential question is this: If the goal is to reduce net CO_2 emissions to zero, how can humankind provide for its energy needs? Timo Makinen, manager for Shell's climate change and GHG strategy, stated that since world oil demand is projected to increase, humankind is destined to remain in the fossil fuel age for the next generation or two. In Canada, oil sands are projected to provide some 75 percent of all gasoline by the year 2020. However, industry is adopting voluntary standards to reduce GHG emissions.

Sequestration Options

Rob Seeley, general manager for Sustainable Development and External Affairs, Oil Sands, for Shell Canada Energy, further described how, starting in the year 2012, the Shell "Quest" project proposes to capture 1.2 million tons of CO_2 generated per year by Shell's Scotford Upgrader facility at Ft. Saskatchewan, which produces synthetic crude oil from oil sands bitumen. After liquefaction, the CO_2 will travel through a 150-kilometer pipeline to oil fields at Pembina and Swan Hills, where it will be used in enhanced oil recovery and/or will be stored in depleted wells. The two fields have the combined potential to store some 150 Gtons of CO_2 over two to five decades after startup in 2012. Shell is also evaluating a project to sequester CO_2 in a deep aquifer, with completion of a test well scheduled for 2008.

Although some costs can be recouped by selling CO_2 to companies engaged in enhanced oil recovery, Seeley pointed out that there is an inherent "economic gap" in the project. Shell does not propose to cover all the costs of this project on its own and is requesting that the province of Alberta and/or the Canadian federal government provide a financial subsidy.

David Keith of the University of Calgary summarized how variations in patterns of land use and the accelerated burning of fossil fuels have modified the global carbon cycle and are on track to produce climate change of uncertain magnitude and impact. Framing climate change as an unintentional and thus unmanaged byproduct of our industrial society, he described the need for management and the prospects for capture and storage of fossil fuel carbon. Currently, Keith noted, there are only two CO_2 sequestration projects operating at the megaton-per-year level. Keith listed a "toolbox" of techniques, including injection of CO_2 into the deep ocean, storage of CO_2 in deep geological formations, and integration of biomass with industrial carbon capture. He also discussed the possibility of using high-altitude nanoparticles to increase the earth's albedo by shading the poles. All these approaches, he warned, would have to be evaluated for safety. The potential for accidents would be high, particularly if these activities were carried out in remote, unpoliced regions.

For example, Farzam Javadpour explained the advantages of CO_2 flooding of depleted oil and gas pools and the challenges of this method, but pointed out that CO_2 stored in geological formations would not be safe from earthquakes. Regarding the sequestration of carbon dioxide as clathrates under deep ocean sediments, Salman Alava of the University of Waterloo noted that liquid CO_2 is more dense than water. At high pressures encountered at depths of around 2 600 meters, it forms clathrate hydrates. If stored beneath undersea sediments, CO_2 clathrates should be stable for millions of years. However, because methane clathrates are also present on the ocean floor, Alava and coworkers performed modeling studies to determine whether a CO_2 clathrate would

be more or less thermodynamically stable than a clathrate-containing methane. They calculated that in a double cage structure, one of the two methane molecules would be replaced by CO_2. Thus the method is at least thermodynamically feasible and could even be a basis for recovery of methane from clathrates. The caveat was added that methane is some 20 times more effective than carbon dioxide as a GHG, so a net release of methane to the atmosphere should be avoided.

The mechanics of post-combustion capture of CO_2 by clathrate hydrate crystallization of carbon dioxide from flue gas was described by Rajnish Kumar of the Clean Energy Research Center, Department of Chemical and Biological Engineering, University of British Columbia. And Kathryn Sheps, MDS Research, described a process by which the formation of carbon dioxide clathrates can be used to achieve simultaneous CO_2 sequestration and desalination of seawater.

The use of landfills to generate methane, which can be converted subsequently to CO_2 with the generation of energy, was described by Rodrigo Diaz of Argentina's Versus Goliath Project Solutions, Inc. P.A. Douglas of the University of Waterloo offered a plan for CO_2 capture and sequestration at a power generation plant on Ontario's Nanticoke Island. Sanni Eloneva of the Helsinki University of Technology described how CO_2 might be utilized with blast furnace or steel furnace slag to produce calcium carbonate. Susana Garcia discussed her preliminary assessment of ferric-iron bearing sediments as sequestration media.

Disposal of an unwanted material can be costly; economists characterize such materials as having "negative value." Consequently, finding uses for captured carbon dioxide was a central theme of CHEMRAWN XVII/ICCDU XII. Charles A. Eckert, coauthor with profesors Charles L. Liotta and Philip G. Jessop, discussed four roles that CO_2 can play in solvents for sustainable technology: (1) supercritical CO_2 as a solvent, (2) gas-expanded liquids, (3) reversible acids, and (4) reversible ionic liquids. A presentation by Jackson Ford further elucidated the catalytic properties of gas-expanded solvents.

An age-old method for CO_2 sequestration is the planting of trees. Jean-François Boucher of the University of Quebec described the effectiveness of forests for this purpose. A paper by N. Scott of Queen's University emphasized that "Canada has enormous potential to use its biological capital to help mitigate rising GHG emissions. With improved management, Canada might be able to sequester 70 Mt CO_2 per year" Robyn Foote of Queen's University discussed how, over a period of a century, carbon is captured in abandoned agricultural land, in association with mineral particles within 10 cm of the surface.

Utilization Efforts

At present rates, humankind consumes each year an amount of fossil fuels equivalent to 400 years of accumulation during prehistory. Jorg Schwender of the Brookhaven National Laboratory in the United States discussed the efficiency of the most abundant protein on earth, RuBisCO, the enzyme in plants that binds 10^{11} tons of CO_2 per year.

Eric Beckman of the Mascaro Sustainability Initiative at the University of Pittsburgh described a number of components, characterized graphically as "wedges," that could be combined to effect GHG mitigation while energy is still produced. These include CO_2 capture and storage, coal gasification, conservation and improved efficiencies, nuclear technology, solar energy, and wind energy. He noted that creating a "wedge" of wind energy would require increasing present-day capacity by a factor of 50—that is, by the installation of 2 million windmills. A solar electricity "wedge" would require utilization of approximately 3 percent of the U.S. land area for solar collectors.

Beckman discussed uses of carbon dioxide as a raw material in chemical production. This attractive option represents, unfortunately, only a small component among potential solutions to the climate change problem because human technology emits far more CO_2 into the atmosphere than can be utilized as industrial products. For example, Beckman noted that if all methanol production worldwide (approximately 33

million tons) were converted to a CO_2-based process, it would consume less than 1 percent of the CO_2 generated by human activity. Additional targets for substitution are the production of chlorine and ammonia. The use of atmospheric CO_2 as a feedstock for high-value products such as diphenyl carbonate and various isocyanates would be too small to have a significant impact on the accumulation of atmospheric CO_2, but it could contribute to an industry's profitability, which might provide an added incentive if a "cap and trade" system of CO_2 credits were created. Beckman noted that CO_2 reforming and synthetic biology should be especially viable areas for future research.

Yuhan Sun of the Institute of Coal Chemistry at the Chinese Academy of Sciences described the synthesis of cyclic carbonates from CO_2 and propylene oxide. Jessica Anderson of Notre Dame University described how carbon dioxide is highly soluble in ionic liquids such as imidazolium tetrafloroborate. Ionic liquids may not be sufficiently common to absorb massive amounts of CO_2, but they are likely to be useful in creating membranes for separating the gas from other components. G. Wytze Meindersma noted that ionic liquids have a "designer ability" that can be employed for separation of CO_2 selectively from hydrocarbons. Angela Dibenedetto of the University of Bari in Italy discussed the synthesis of organic carbonates from aliphatic alcohols and CO_2.

M. Halmann of the Weizmann Institute in Israel described how a considerable savings of energy and a reduction in CO_2 emissions could be realized by employing solar energy in the commercial Pidgeon process of calcining dolomite. Richard H. Heyn of the University of Oslo in Norway explained the use of metal-organic frameworks as low-temperature adsorbants of carbon dioxide. Chang-Jin Liu of Tianjin University described how plasmas can be used to prepare effective catalytic surfaces for the reforming of synthesis gas ($CO + H_2$) from methane and carbon dioxide. This could eliminate the need for separation when biogas contains large amounts of CO_2 and hydrocarbons.

Daniel Hoornweg of the World Bank noted that 80 percent of GHG emissions are produced in or for cities, specifically by activities that generate electricity and heat and by transportation, commercial, and manufacturing operations. He pointed out that, ironically, residents of cities are probably the most vulnerable to events such as flooding that could be caused by climate change. Hoornweg outlined measures that are being taken in cities to reduce emissions, particularly water conservation, energy efficiency, and improved transportation. The World Bank, he said, has projects that include producing an index of GHG emissions and energy use, sending SWAT teams to pilot cities, and serving as an "honest broker" to encourage use of best practices worldwide.

Venkata Pradeep Indrakanti outlined his theoretical and experimental studies on photochemical reduction of CO_2 at surfaces of La-doped and undoped titania. R. Mann from the University of Manchester in the United Kingdom presented an analysis by K. Winch on how electricity derived from wind power could be used to resynthesize jet fuel from CO_2 isolated from stationary power plants. The price of this transformation is projected to be some 36 pence per liter. By 2020 this price could well be competitive with the cost of jet fuel from conventional sources.

John Macdougall of the Alberta Research Council explained that fixation of CO_2 using photosynthetic algae in ponds shows promise for producing renewable biofuels and biomaterials. A project by Innoventures Canada (ICAN) to use microalgal mass cultivation has the potential to convert concentrated streams of CO_2 (flue gases) into microalgal biomass. The products can be processed and fractionated to produce value-added compounds.

Kruamas Smakgahn of the National Institute for Agro-Environmental Sciences in Tsukuba, Japan, described how changes in the cultivation of field rices can minimize production of GHGs. Elevation of the concentration of ferric ion and the incorporation of rice straw into the soil, combined with appropriate field drainage, causes decreased production of methane. And appropriate field drainage and the application of fertilizers minimizes the production of nitrous oxide.

Rob Stephenson described how anaerobic digestion of sewage sludge in a wastewater treatment plant can create burnable hydrocarbons. These can be utilized in a generator, and the resulting electricity can replace the power consumed in operating the plant. Shirley Thompson of the University of Manitoba described how diversion of waste destined for landfills back into the production scheme can help Canada reach its Kyoto goals. Wei Wei of the Institute of Coal Chemistry at the Chinese Academy of Sciences discussed how magnesium-aluminum complex oxides can absorb CO_2, after which it could be used in synthesis. Yasuhiko Yoshida of Toyo University described

combinatorial screening of catalysts and processes for CO_2 copolymerization. It was found that $C_{60}(OH)_n$ is a useful catalyst for the process and that the use of plasmas is effective.

In sum, a large number of policy, sequestration, and mitigation strategies were proposed at CHEMRAWN XVII/ICCDU-IX. Adroit decisions and numerous effective technologies will be required to bring GHG emissions under control. As one conferee phrased it, "There is no silver bullet solution to the GHG problem, but there is silver buckshot."

As conference cochairs Keith Marchildon and Philip Jessop wrote: "This combined event . . . is more than just an exercise in organizational synergy and more than just the sum of two events that happen to have a substance, CO_2, of common interest. Some methods of CO_2 utilization are, or could be, on a large enough scale as to be able to contribute to mitigation efforts; an obvious example is enhanced oil recovery. But many smaller uses of CO_2 also share with mitigation the objective of sparing the earth's environment. So all parts of the conference have the same laudable environmentally beneficent objective, and all participants can take satisfaction in being part of an event that helps further this great cause.

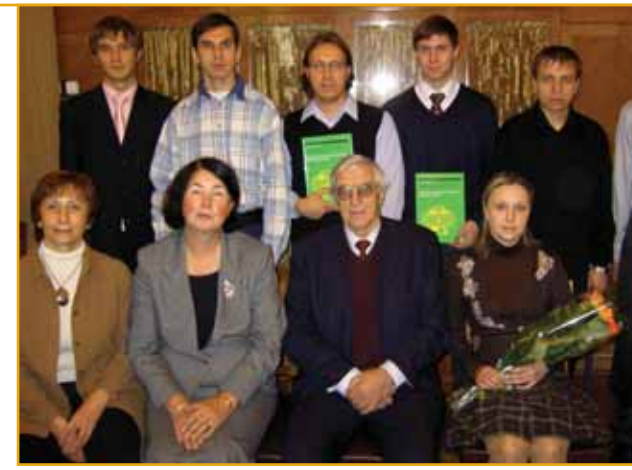
John M. Malin <jmalin023@comcast.net> was the chair of the CHEMRAWN Committee in 2007; he has been involved with the committee since 1998.

Mendeleev Congress on General and Applied Chemistry

by Natalia Tarasova

The **XVIII Mendeleev Congress on General and Applied Chemistry** took place in Moscow 23–28 September 2007. The Congress celebrated the 100-year anniversary of the Mendeleev Congresses in Russia and the forthcoming 175th birthday of Dmitry Ivanovitch Mendeleev in 2009.

The congress was organized under the auspices of IUPAC, and the President of the Russian Federation, Vladimir Putin, and the first deputy to the chairman of the Russian Government, Sergey Ivanov, both sent warm greetings to the participants. The president of IUPAC, Bryan Henry, welcomed the Congress on behalf of the global chemical community, and the mayor of Moscow, Jury Luzhkov (a professional chemist by trade and education), in an emotional speech stressed the importance of chemistry worldwide and specifically for Russia and Moscow.



The winners of the IUPAC Poster Prize for young chemists and the winners of the Special Prize for young chemists in the session "Catalysis, Petrochemistry, Refining," shown together with Oleg Nefedov (front row, center), president of Mendeleev Congress, and Natalia Tarasova (front row, second from left), chairman of the congress's International Advisory Committee.

More than 3 850 scientists—among them more than 1 000 young scientists and students—came to the Russian capital for the conference, representing 53 Russian towns and 7 countries in the Commonwealth of Independent States. Numerous representatives from the Russian Academy of Sciences, from Russian ministries and other governmental organizations, and from national chemical societies abroad were also in attendance.

The program included 17 plenary lectures on mainstream directions in fundamental chemistry, innovations in chemistry and chemical technology, and chemistry education. Lectures by Nobel Prize laureates J.-M. Lehn (France), R.R. Schrock (United States), and J.I. Alferov (Russia) drew particularly large crowds, as well as media attention. All told, 430 scientists made oral presentations during 77 sessions of 9 sections and 5 satellite international symposia. In addition, 2 173 posters (representing 13 500 authors) were presented, and 3 560 abstracts were published in the congress proceedings.

The most advanced directions in research, the newest approaches, and various perspectives on the different branches of chemistry were discussed at the conference, including nanotechnology, space research, synthesis of the new elements of the periodic table, energy and resource conservation, renewable energy sources, and health care. A symposium on "The Social Responsibility of Chemists: Green Chemistry" was particularly well attended, and aimed at disseminating new educational materials related to responsible stew-

ardship and addressed all aspects of chemistry (see Project Place p. 23; IUPAC project 2006-043-3-050).

The state of chemistry education was also thoroughly discussed, including current educational practices and innovations, the public's understanding of chemistry, chemistry education for gifted children and for modern industries, high school chemistry, and university-level chemistry.

In addition, two roundtables dealt with the "chemistry" of megapolicies and the problems of the interaction of the scientific and educational communities with business. Representatives from the Moscow government, oil and gas companies, and the academic end educational communities were trying to find consensus on these important issues.

The congress also approved recommendations on the development of chemical science, technology, and education in Russia. And the participants supported IUPAC's initiative designating 2011 the International Year of Chemistry.

Natalia Tarasova <nptar@online.ru> was chairman of the XVIII Mendeleev Congress's International Advisory Committee. She has been a member of IUPAC's Committee on Chemistry Education since 2002 and was recently elected a member of the Bureau.

Novel Materials and Fine Chemistry

by Yuping Wu

The **IUPAC International Symposium on Novel Materials and Synthesis** (NMS) was initiated in 2007. Since then it has been held jointly with the International Symposium on Fine Chemistry and Functional Polymers (FCFP), which was first held in 1985 in China and has been held almost annually since then. This year, the third NMS symposium (NMS-III) was held on 17–21 October 2007, again at Fudan University in Shanghai, China, and again in conjunction with FCFP (FCFP-XVII).

Fudan University, established in 1905, is one of the most famous universities in China. The name "Fudan" comes from the Confucian classics and means "unremitting effort." The university is situated in Shanghai City, the most dynamic metropolis in China and the home of the upcoming 2010 World Expo.

NMS-III was financially sponsored by IUPAC, the National Natural Science Foundation of China, Shanghai Key Laboratory of Molecular Catalysis and Innovative Materials, the Shanghai Society of Chemistry and Chemical Industry, and the National Basic Research Program of China (2007CB209700). Welcoming and opening addresses were delivered by cochairman Yingyan Jiang, head of the Department of Chemistry at Fudan University; Yi Tang, IUPAC representative; and Stanislaw Penczek.

More than 200 participants from 34 foreign countries and areas and some local delegates attended the conference. More than 10 foreign participants were from industry, including Sanyo Chemical Industries Ltd., TICONA GmbH, Mitsubishi Chemical Corporation, Givaudan Schweiz AG, DSM Pharma Chemicals, and Givaudan Ltd. The symposium mainly discussed novel polymers with different functions, novel organic chemicals, asymmetric synthesis and other synthesis methods, and novel energy materials, including solar cells, fuel cells, lithium ion batteries, supercapacitors and Ni-MH batteries, nanomaterials, and other novel materials and synthesis related to the environment, medicine, and fragrance. Prominent scientists such as Jean-Marie Lehn (France, Nobel Laureate in Chemistry, 1987), Jean-Pierre Vairon (France), Shinji Takeoka (Japan), Makoto Shimizu (Japan), Masahiro Yamashita (Japan), J.H. Choy (South Korea), Allan S. Hoffman (United States), Stanislaw Penczek (Poland), Dongyuan Zhao (China), Zhengzhong Shao (China), Yunqi Liu (China), and Klaus Kurz (Germany) presented their research. Various companies introduced their latest developments related to novel materials, and an NMS Nobel Laureate Lecture Room was established with the goal of having Nobel Laureates deliver public lectures during the symposium to help laypeople better understand science and technology.

Yuping Wu's group with Prof. Jean-Marie Lehn (France, Nobel Laureate in Chemistry, 1987), Prof. Chen (China) and Prof. Tang (China).

The discussion during the symposium was very active, and many participants rated the symposium and its organization highly, particularly for providing a high-level platform for exchanging ideas related to novel materials and synthesis.

Of course, fun was also to be had. Yuping Wu's group from the Laboratory for New Energy and Materials organized a variety of events for the participants, including an acrobat performance, a night boating tour along the Pujiang River, and a tour of Shanghai.

The NMS Organizing Committee has decided to hold this symposium biennially in Shanghai; accordingly, the next Shanghai event (NMS-V and FCFP-XIX) will be held 18–22 October 2009. This year's conference, NMS-IV and FCFP-XVIII will be held at Jiangsu University at the beautiful port city of Zhenjiang, near Nanjing, on 15–18 October 2008.

Yuping Wu <wuyp@fudan.edu.cn> is a professor at the Laboratory for New Energy and Materials, Department of Chemistry, Fudan University, Shanghai, China.

Public Health Applications of Human Biomonitoring

by Paul Erhardt

The **Public Health Applications of Human Biomonitoring** international workshop was sponsored by the U.S. Environmental Protection Agency (EPA) and the International Council of Chemical Associations (ICCA). It took place 24–25 September 2007 at the EPA Main Campus Auditorium in Research Triangle Park, North Carolina, in the United States. Nearly 200 participants attended from government, academia, and industry, representing the United States, Canada, Europe, and Japan. Paul Erhardt, a member of the Chemistry and Human Health Division of IUPAC, represented IUPAC, standing in for President Bryan Henry who was unable to attend. As part of a plenary roundtable session pertaining to international perspectives on human biomonitoring, Erhardt delivered a lecture entitled "Challenges Faced in Less Industrialized Regions of the World," which described IUPAC and some of its activities.

Other plenary sessions discussed various initiatives that are being undertaken across Europe and within the United States, Canada, and Japan and addressed specific topics such as children's health. Technical sessions were run in parallel, with topics ranging from the application of biomonitoring data to usefully characterize and prioritize certain vulnerable populations, to discussions on environmental carcinogens within the session on scientific advances in the interpretation of biomonitoring data. Although considerable focus was directed toward metals, a broad range of other environmental chemical contaminants were also covered. Overall, a high level of scientific quality was conveyed by the various technical presenters, who took a very open approach toward engaging in discussions as to how to most appropriately implement their findings (if they were ready to be implemented at all).

It is clear that IUPAC can play a useful role in this area by continuing our ongoing efforts to harmonize analytical measurements in terms of definitions and standards, particularly at the clinical level. It may also be worthwhile for us to consider serving as a central hub to enhance the internationalization of the numerous national and European initiatives. Such an effort might be best contemplated by IUPAC's Division on Chemistry and the Environment. In this regard, it can be noted that while certain of the IUPAC Chemistry and Human Health Division's Subcommittees have interests in chemical toxicology and clinical chemistry measurements in general, our interests in biomonitoring extend less toward environmental issues and more toward the identification of biomarkers that are useful for the development of new diagnostic and therapeutic agents to treat human disease while avoiding toxicity.

For more information about the meeting, including access to the presentations made during the meeting, please visit the EPA website at http://es.epa.gov/ncer/publications/meetings/09_25_07.

Paul Erhardt <PErhard@UTNet.UToledo.Edu> is a member of IUPAC's Chemistry and Human Health Division. He is a professor at the College of Pharmacy at the University of Toledo in Toledo, Ohio, in the USA.

Where 2B & Y

Vanadium

17–19 July 2008, Lisbon, Portugal

The **6th International Vanadium Symposium** (V6 Symposium) will take place 17–19 July 2008 at Fundação Calouste Gulbenkian in Lisbon, Portugal.

The V6 Symposium is being held under the auspices of IUPAC, the Sociedade Portuguesa de Química, the Portuguese Governmental Fundação para a Ciência e Tecnologia, and the Instituto Superior Técnico–TU Lisbon. The Centro Química Estrutural, a research center of the Instituto Superior Técnico–TU Lisbon (João Costa Pessoa, chair), is organizing the symposium in collaboration with the Japanese Universities of Hiroshima (Hitoshi Michibata, cochair, Department of Biological Science) and Toyama (Kan Kanamori, cochair, Department of Chemistry).

The V6 Symposium will highlight the manifold applications of vanadium compounds and is intended to attract academicians, researchers, and industry representatives as well as students interested in vanadium chemistry and biochemistry. The conference will feature lectures by invited speakers and oral and poster presentations. Main topics will include:

- vanadium inorganic chemistry—coordination, speciation, and structure
- vanadium bioinorganic and biological chemistry
- enzymology, toxicology, and transport of vanadium compounds
- therapeutic applications of vanadium compounds—design and mechanism of action
- vanadium in catalysis (homogeneous and heterogeneous)—organic compounds and polymers
- polyoxovanadates, new materials, and processes

The deadline for abstract submission is 15 May 2008.

See Mark Your Calendar on page 40 for contact information.

www.vanadiumsix.com

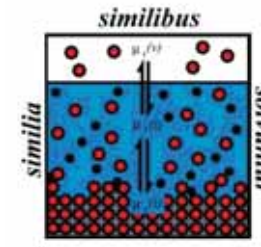
Solubility and Equilibria

27–31 July 2008, Dublin, Ireland

The **13th International Symposium on Solubility Phenomena and Related Equilibrium Processes** (13th ISSP) will be held at Trinity College in Dublin, Ireland, 27–31 July 2008. This is the latest in a successful series of biennial meetings that brings together scientists from diverse subject areas in which solubility and associated equilibria play important roles.

The 13th ISSP will continue its multidiscipline tradition with contributions from theory and modeling, biological systems, industrial processes, environmental chemistry, and geochemistry, among others.

The program includes plenary and keynote lectures, oral presentations, a poster session, and a workshop on the IUPAC Stability Constants database project. As always, contributors will be drawn from a wide range of countries; more than 30 countries were represented at the 12th ISSP. The symposium language will be English.



Dublin, the capital of Ireland, was founded more than 1 000 years ago and combines the charm of a mature European capital with the excitement of one of the continent's fastest-growing modern cities. Located in the city center, the 16th-century Trinity College has modern conference facilities and accommodation in its elegant period buildings. The college houses the famous Book of Kells, among other treasures.

See Mark Your Calendar on page 40 for contact information.

www.isspdublin08.com

Humic Substances

14–20 September 2008, Moscow to St. Petersburg, Russia

This conference is the **14th International Meeting of the International Humic Substances Society** (IHSS-14) and will be held on 14–19 September 2008 in Russia aboard a ship traveling from Moscow to St. Petersburg. The satellite exhibition, "Humic Materials—Resources for the 21st Century," will be part of the conference.

With topics ranging from molecular understanding to innovative applications of humic substances, this conference aims to demonstrate the growing importance of humic substances in the context of global climate change and highlight how to draw the attention of industrial chemists to the conversion of huge resources of humified biomass to alternative feedstock for biobased products. Sources encompass different stages of biomass humification, from mature lignites, peats, and, sapropels to young composts and humic materials that occupy a niche between fossil rocks and fresh biomass.

The most striking feature of humic materials in a biobased economy is the constellation of such properties as nontoxicity, biocompatibility, resistance to biodegradation, and polyfunctionality. Diverse functional and hybrid materials can be derived on the basis of humic materials. These materials—such as bioplastics and green specialty chemicals (dispersants, flocculants, chelators), elicitors, immunomodulators, and others—would be competitive on the market of biobased products.

The aim of this conference is to expand the view of humic substances as the components of organic matter in soil and water to a broader understanding of the potential of humic materials as alternative feedstock for a biobased economy. A conference resolution for formulating a strategic research agenda for humic science and technology will be presented for adoption.

See Mark Your Calendar on page 41 for contact information.

www.ihss-14.humus.ru

Macromolecules and Materials

8–11 September 2008, Kruger National Park, South Africa

The **10th Annual UNESCO/IUPAC Conference on Macromolecules** will be held 7–11 September 2008 in Berg-en-Dal Restcamp, Kruger National Park, South Africa. The conference will focus on characterization, morphology, olyolefins, advanced synthesis, and special applications.

See Mark Your Calendar on page 41 for contact information.

http://academic.sun.ac.za/unesco/

Chemistry for Sustainable Development

23–25 May 2008, Kathmandu, Nepal

The Nepal Chemical Society is pleased to announce that the **Chemical Congress 2008** will be held 23–25 May 2008 in Kathmandu in association with the Tribhuvan University and the Kathmandu University. The main goal of the congress is to emphasize the role of chemistry in the sustainable development of developing countries.

The congress will provide a wide forum for participants from various disciplines to discuss the latest developments in chemical research, technologies, and chemical education, with special emphasis on the role of chemistry in the sustainable development and improvement of life in developing countries.

Leading experts have been invited from different sectors of the chemistry, chemical industries, and

chemical education fields from across the globe to deliver plenary, keynote, and invited lectures in the congress. There will also be programs for young chemists and schoolchildren to draw the attention of the younger generation to national development via sustainable chemistry. Given its limited resources, which come from participant registration, the society is requesting financial contributions to help guarantee the success of this upcoming congress.

Since its inception in April 1979 with 51 founding members, the Nepal Chemical Society has grown into a professional organization of the highest standing in Nepal and has worked hard to promote excellence in chemistry in Nepal. The society is actively involved in promoting chemistry education at the precollege, college, and university levels, given its belief that chemistry plays a key role in Nepal's national development and social well-being. A survey of the development of advanced countries versus their investment and success in science and technology shows that the advancement of science and technology is an index of overall national development and standard of living.

Nepal has abundant and highly diversified natural resources, including one of the world's richest reservoirs of medicinal plants and a wide variety of minerals. It is also one of the world's richest countries in water resources. It is a bitter fact that despite these resources, Nepal's economic development and living standard are among the world's poorest. The country's scientific communities are focusing on the potential role of science and technology on national development and the utilization of Nepal's natural resources. The conference is a call to chemists, chemical technologists, chemistry students, and related professionals to organize a unified effort to utilize chemistry and related technologies for national development.

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Thermophysical Properties

21–26 June 2009, Boulder, Colorado, USA

The **17th Symposium on Thermophysical Properties** will be held 21–26 June 2009 in conjunction with the 3rd IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants. Some sessions will be held jointly. The symposium is concerned with theoretical, experimental, simulation, and applied aspects of the thermophysical properties of gases, liquids, and solids, including biological systems.

Appropriate topics are:

- thermodynamic properties, including equation of state, phase equilibria, p-V-T behavior, heat capacity, enthalpy, thermal expansion, sound speed, and critical phenomena
- transport properties, including thermal and electrical conductivity, viscosity, mass diffusion, thermal diffusion, non-Newtonian behavior, thermal, thermoacoustic, and other diffusion waves
- optical and thermal radiative properties, including dielectric constant, refractive index, emissivity, reflectivity, and absorptivity
- interfacial properties, including solid-solid interfaces, surface tension, interfacial profiles, interfacial transport, and wetting
- data correlation, including data evaluation and prediction, standard reference data, databases, and storage and retrieval of thermophysical property data

Abstracts of 200–300 words must be received by 5 December 2008. The abstracts must be submitted through the symposium web page below.

http://symp17.boulder.nist.gov

Mark Your Calendar

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

2008

IUPAC poster prizes to be awarded

17–18 April 2008 • Chemistry Education • Manila, Philippines
Improving Chemical Education in the Philippines
Kapisanang Kimikang Pilipinas, Telefax No. 920-5427, E-mail: ivillase@yahoo.com

25 April 2008 • Chemistry and Industry • Marl, Germany
Chemistry in a Changing World—New Perspective Concerning the IUPAC Family
Michael J. Droescher, E-mail: michael.droescher@degussa.com

2–6 June 2008 • Molecular Order and Mobility in Polymer Systems • Saint-Petersburg, Russia
6th International Symposium on Molecular Order and Mobility in Polymer Systems
Prof. T.M. Birshtein, Institute of Macromolecular Compounds, Russian Academy of Sciences (IMC RAS), Bolshoi pr. 31, Saint-Petersburg, RU-199004 Russia, E-mail: birshtein@imc.macro.ru

22–27 June 2008 • Organic Synthesis • Daejeon, Korea
International Conference on Organic Synthesis (ICOS-17)
Prof. Sung Ho Kang, Department of Chemistry, KAIST, Daejeon 305-701, Korea, Tel.: +82-42-869-2825, Fax: +82-42-869-2810, E-mail: shkang@kaist.ac.kr

29 June–4 July 2008 • Macro 2008 • Taipei, China
Polymers at Frontiers of Science and Technology
Conference Secretariat, MACRO 2008, Department of Chemical Engineering, National Tsing-Hua University, 101, Section 2, Kuang-Fu Road, Hsinchu, 30013 Taiwan, Tel.: (03) 5713131 ext. 33683, Fax: (03) 5715408, E-mail: acsu@mx.nthu.edu.tw

6–11 July 2008 • Solid State Chemistry • Bratislava, Slovakia
8th Conference on Solid State Chemistry
Dr. Milan Drabik, Ceramics Department, Institute of Inorganic Chemistry, Slovak Academy of Sciences, SK-84536 Bratislava, Slovakia, E-mail: uachmdra@savba.sk, Tel.: +421 (7) 5941-0474, Fax: +421 (7) 5941-0444

13–18 July 2008 • Biodiversity and Natural Products • Charlottetown, Prince Edward Island, Canada
International Conference on Biodiversity and Natural Products (ICOB-6 & ISCNP-26)
Prof. Russell Kerr, Department of Chemistry, University of Prince Edward Island, 550 University Avenue Charlottetown, PEI C1A 4P3, Canada, Tel.: + 1 902 566 0565, Fax: +1 902 566 0632, E-mail: rkerr@upei.ca. Ann Worth, Conference Manager, E-mail: info@iupac-icbnp2008.com

13–18 July 2008 • Physical Organic Chemistry • Santiago de Compostela, Spain
19th International Conference on Physical Organic Chemistry (ICPOC-19)
Prof. J. Ramón Leis, Faculty of Chemistry, Universidad de Santiago de Compostela, E-15782 Santiago de Compostela, Spain, E-mail: qfjrleis@usc.es, Tel.: +34-98-156-3100, Fax: +34-98-159-5012

17–19 July 2008 • Chemistry of Vanadium • Lisbon, Portugal
6th International Symposium on Chemistry and Biological Chemistry of Vanadium
Prof. João Costa Pessoa, Centro de Química Estrutural, Instituto Superior Técnico—TU Lisboa, Av. Rovisco Pais P-1049-001 Lisboa, Portugal, Tel.: +[351] 218 419 268, Fax: +[351] 218 464 455, E-mail: joao.pessoa@ist.utl.pt

20–24 July 2008 • Polymer Colloids • Prague, Czech Republic
2008 Prague Meetings on Macromolecules—48th Microsymposium "Polymer Colloids: From Design to Biomedical and Industrial Applications"
Dr. Daniel Horák, Institute of Macromolecular Chemistry, Heyrovský Sq. 2, CZ-162 06 Prague 6, Czech Republic, Tel.: + 42 029 680 9260, Fax: +42 029 680 9410, E-mail: horak@imc.cas.cz

27–31 July 2008 • Solubility Phenomena • Dublin, Ireland
13th International Symposium on Solubility Phenomena Including Equilibrium Process (ISSP-13)
Prof. Earle W. Waghorne, Chairman, School of Chemistry & Chemical Biology, University College, Belfield, Dublin 4, Ireland, Tel.: +353 1 716 2132, Fax: +353 1 716 2127, E-mail: earle.waghorne@ucd.ie

27 July–1 August 2008 • Carbohydrates • Oslo, Norway
24th International Carbohydrate Symposium (ICS 2008)
Prof. Berit Smestad Paulsen, School of Pharmacy, University of Oslo, P.O. Box 1068 Blindern, N-0316 Oslo, Norway, Tel.: +47 22 856 572, Fax: +47 22 854 402, E-mail: b.s.paulsen@farmasi.uio.no

27 July–2 August 2008 • Bioanalytical and Biochemistry • San Juan, Puerto Rico

XXVIII Latin American Chemistry Congress and PRCHEM 2008 (FLAQ-2008)—Bioanalytical and Biochemistry: Their Role in Bioscience and Biotechnology

Dr. Ethel Rios-Orlandi, Chairman of the Scientific Program, Colegio de Quimicos de Puerto Rico, 52 Hatillo Street, San Juan 00918, Puerto Rico, Tel.: +1 787-763-6070, Fax: +1 787-758-2615, E-mail: cqpr@cqpr1941.org or flaq2008@cqpr1941.org

28 July–1 August 2008 • Photochemistry • Gothenburg, Sweden

XXII IUPAC Symposium on Photochemistry

Prof. Devens Gust, Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ, USA, 85287-1604, USA, Tel.: +1 602 965 4547, Fax: +1 602 965 2747, E-mail: gust@asu.edu

3–8 August 2008 • Chemical Education • Pointe aux Piments, Mauritius

20th International Conference on Chemical Education: Chemistry in the Information & Communications Technologies Age, (20th ICCE)

Dr. Ponnadurai Ramasami, Department of Chemistry, University of Mauritius, Reduit, Mauritius, E-mail: p.ramasami@uom.ac.mu

3–8 August 2008 • Chemical Thermodynamics • Warsaw, Poland

20th International Conference on Chemical Thermodynamics

Questions should be addressed to E-mail: info@icct2008.org. Comments, concerns, proposals, etc., should be addressed to E-mail: secretariat@icct2008.org.

8–11 September 2008 • Macromolecules & Materials • Kruger National Park, Mpumalanga, South Africa

10th Annual UNESCO/IUPAC Conference on Macromolecules & Materials

Prof. Ronald D. Sanderson, Department of Chemistry & Polymer Science, University of Stellenbosch, Stellenbosch 7602, South Africa, Tel.: +27 (21) 808-3172, Fax: +27 (21) 808-4967, E-mail: rds@sun.ac.za

14–20 September 2008 • Green Chemistry • Moscow, Russia

2nd IUPAC Conference on Green Chemistry

Prof. Valery V. Lunin, Chairman Russia Chemistry Department, M.V. Lomonosov Moscow State University, Leninskiye Gory 1, build. 3, 119992 Moscow Russia, Tel.: +7-495-9394575, Fax +7-495-9394575, E-mail: vvlunin@kge.msu.ru

14–20 September 2008 • Humic Substances • Moscow, Russia

14th Meeting of the International Humic Substances Society (IHSS-14)

Prof. Irina V. Perminova, Department of Chemistry, Moscow State University, 119992 Moscow, Russia, E-mail: iperm@org.chem.msu.ru, Tel: +7 495 939 5546, Fax: +7 495 932 8846

12–17 October 2008 • Biotechnology • Dalian, China

13th International Biotechnology Symposium (ISB 2008): "Biotechnology for the Sustainability of Human Society"

Prof. Fengwu Bai, Dept. of Bioscience & Bioengineering, Dalian University of Technology, 2 Linggong road, Dalian 116023, China, Tel.:+86 411 84706329, Fax:+86 411 84708083, E-mail: fwbai@dlut.edu.cn

26–30 November 2008 • Soil Science • Pucon, Chile

International Symposium of Interactions of Soil Minerals with Organic Components and Microorganisms

Dra. Maria de La Luz Mora, Universidad de La Frontera, Ciencias de Recursos Naturales, Temuco, Chile, Tel: +56 45 325479, Fax: +56 45 325053, E-mail: mariluz@ufro.cl

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