

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

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Interest Keeps
Growing in
Natural Products
Chemistry

Camptothecin and
Taxol: The Story
Behind the Science

PAC's Special Topic
Issue on Natural
Products



From the Editor

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What do you do when you find yourself wondering about the meaning of your job? While working more and ignoring the question might be an option, it does not provide the satisfaction that one might look for! Personally, I have often found the motivation and energy I needed in a lecture hall, listening to someone talk about science.

While I was a college student, having enrolled in chemistry classes, there were many times when I lost sight of the big picture and my interest started to wane. The classes were very technical, and the numerous challenges were apparently unrelated to each other. And yet, for myself, I needed to acquire a sense of progression, which did not transpire easily from our curriculum. One highly motivating moment occurred



when I attended a public lecture by Hubert Reeves. With humor, energy, and simplicity, this charismatic scientist took us on a journey of the universe. The picture was bright and clear: science was the answer, and chemistry an exciting part of it. Science is a puzzle, and in a few words, Reeves explained to those assembled the joy of putting the pieces together. At that time, he gave me the motivation to continue my degree—and to go back to p. chem. and thermo. classes.

During graduate school, I was fortunate to attend several scientific meetings where I received inspiration from many lecturers. Those who most impressed me were not only chemists, but those who tried to reach beyond the boundaries of their specific disciplines. For example, I recall listening to physicists, who spoke about solitons and polarons and who made us understand that behind a concept there is a reality that comes from the understanding of physics merged with chemistry; and biologists and biochemists who showed how nature works, and encouraged us to reproduce and/or adapt similar processes for designing drugs or protecting crops.

Today, I have left the laboratory, but I am still privileged to have a job that keeps me close to science and scientists. At work, I often have the chance to push things forward and hopefully facilitate the job of volunteers who choose to participate in IUPAC activities. When all that is not enough to keep me going, I simply return to the science lecture hall at a nearby university and the magic happens once again as the new ideas and challenges of science provide fresh motivation. This August however, the place to go for such inspiration will be the IUPAC Congress, where the theme of Chemistry at the Interfaces promises many vibrant presentations.

Fabienne Meyers

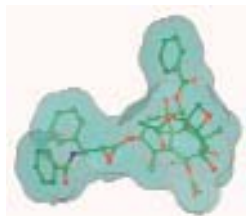
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Cover: "Chemistry in a Flask," by Francesco Tundo—for more about the artist see www.iupac.org/images/tundo.

Contents

CHEMISTRY International July-August 2003 Volume 25 No. 4



Vice President's Column	2
Features	
Camptothecin and Taxol: The Story Behind the Science <i>by Nicholas H. Oberlies, Sharla Flora, and Anna L. Weaver</i>	4
Striving for Open Access <i>by Wendy Warr</i>	7
Chemical Weapons Convention: First Major Review Completed <i>by Edwin D. Becker</i>	9
IUPAC Briefs Delegates to CWC Review Conference	10
IUPAC Wire	
IUPAC Announces Prize Winners	12
Highlights of the Executive Committee Meeting	13
IUPAC Funds Three Conferences to be Held in 2004 in Developing and Disadvantaged Countries	14
Bio-Unions to Pursue Science for Health and Well-Being	14
Methods of Analysis and Sampling of Food Products	15
IUPAC Elections	16
The Project Place	
NMR Chemical Shifts: Updated Conventions	23
Terminology for Radical Polymerizations with Minimal Termination	23
Toward a Core Organic Chemistry Curriculum for Latin American Universities	23
Rules for Stating When a Limiting Value is Exceeded	24
Provisional Recommendations	25
Making an imPACT	
Critical Evaluation of Stability Constants for α -Hydroxycarboxylic Acid Complexes with Protons and Metal Ions and the Accompanying Enthalpy Changes Part II: Aliphatic α -Hydroxycarboxylic Acids	26
Endocrine Disruptors in the Environment	26
Measurement of pH: Definition, Standards, and Procedures <i>reviewed by Friedrich G. K. Baucke</i>	27
Bookworm	
Natural Products	28
Molecular Order and Mobility in Polymer Systems	29
New Polymeric Materials	30
The Experimental Determination of Solubilities	30
Chemicals in the Atmosphere: Solubility, Sources and Reactivity	31
Photochemical Purification of Water and Air	31
Conference Call	
Safety in Chemical Production <i>by M. D. Booth</i>	32
Physiological Reference Values: A Shared Business <i>by Anders Kallner</i>	33
Where 2B & Y	35
Mark Your Calendar	38

Vice President's Column

It's Time to Improve IUPAC's Communications

by Leiv K. Sydnes



It has been a year since I announced in this column that my Vice President's Critical Assessment (VPCA) would focus on communication. According to the Union's bylaws the "Vice President shall submit to the Bureau biennially a critical assessment of the programs and projects of all IUPAC bodies." The Union's internal communications

are an important component of all the programs and projects that were recently reviewed, and yet the way we communicate often seems to be taken for granted, even though our changing world is offering new means of exchanging information.

The importance of interaction and communication with the global chemical community has been recognized by IUPAC. In fact, an extensive communication activity is a requirement, even a prerequisite, if the Union is to realize its ambitious Mission Statement.

Reviewing IUPAC's current practices, one can identify four main communication channels:

1. written correspondence between the IUPAC Secretariat and the National Adhering Organizations (NAOs), the most traditional channel
2. printed publications such as *Pure and Applied Chemistry* and *Chemistry International*
3. IUPAC-sponsored conferences
4. electronic communication such as e-mail and the IUPAC Web site

The quality of IUPAC's services to the global scientific community depends on how well the four communication channels are used to disseminate information and interact with IUPAC stakeholders.

In preparation for my critical assessment, I visited as many NAOs as possible to discuss, among other issues, the fundamental question of how to improve communication. Since my visits started in October 2002, I have had discussions with representatives of 18 NAOs and Associate National Adhering Organizations (ANAOs) in all parts of the world,

except Africa. The perspective of these discussions was introduced in a letter that preceded my visit:

"[. . .] I believe firmly that the chemical community, including the chemical industry, and the society at large will not benefit properly from all the good work done in and by IUPAC unless the communication is improved. [. . .] This challenge has to be taken seriously, and as part of my VPCA I am therefore going to visit a number of NAOs and discuss what IUPAC can do to remove communicative bottlenecks and obstacles, and how IUPAC should go about to facilitate involvement in IUPAC work of more chemists from more of the union's member countries. In this connection I would be delighted to have a meeting with the National Adhering Organization and discuss the questions raised above in the perspective: What changes have to be done to the way IUPAC operates to satisfy [your] expectations of the union?"

Detailed analysis and assessment of each channel of communication are presented in my VPCA and are the result of an iterative process. The inputs received during the very fruitful consultations with the NAOs have been particularly valuable. Many issues raised in that document will require more attention, but recurrent problems appear to include a lack of responsiveness or poor dissemination.

One example comes from the formal and important correspondence by letter between the IUPAC Secretariat and the NAOs. Most of the letters are minutes, calls for nominations, or other information that require consideration and feedback. In spite of the small volume of this correspondence, there are problems associated with it, the nature of which differs for the sender and the receiver. From the Secretariat's point of view the main problem is the low reply percentage. Even when the 44 NAOs are contacted by mail regarding a matter of importance to the Union, it is rare to receive more than 5 replies. As a consequence, very few people are in fact involved in the decision-making process.

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From the NAOs' point of view the main problem appears to be related to the contents of some of the correspondence. This is particularly the case for NAOs that represent countries that have barely or not at all been represented in IUPAC activities in recent years, and which therefore have little knowledge about how the organization works and what the challenges are. Under such circumstances, the natural tendency is not to comment when the subject is unfamiliar. This is a circle that must be broken to generate interest in IUPAC and engagement in its scientific activities in countries lacking a tradition of involvement.

Another problem is related to the limited transmission of information to each NAO's national chemical community about IUPAC and its activities. With the exception of news items about the IUPAC conferences, the general impression is that most NAOs do less than expected to keep their chemical communities well informed about what IUPAC does. Such poor dissemination seems to be most prevalent in countries that have had little or no representation on IUPAC committees and groups in recent years, or where the national academy (or an equivalent body), and not the national chemical society (or the largest chemical society in the country), functions as the IUPAC NAO. When a chemical community knows little about what IUPAC does, it is naturally less probable that members of that community will become engaged in the scientific work carried out in IUPAC.


Nowadays, electronic communications makes the exchange of information timely and cost effective and for the last few years IUPAC has given high priority and spent a lot of money to improve its electronic communication. The efforts have paid off, and IUPAC is now running an efficient office based on e-mail correspondence and Web-based presentations. The Web site is updated regularly and includes information about new and completed projects and other IUPAC activities. Updates are regularly featured in the IUPAC e-news, a complimentary e-mail newsletter. But in spite of these efforts, it seems that very little IUPAC information finds its way into the national chemical magazines published by the chemical societies in IUPAC-member countries. As a matter of fact, other

than IUPAC conference announcements, most of these national magazines do not contain any information about IUPAC on a regular basis. That is an awkward situation that ought to be rectified.

To summarize my assessment, I found that the scientific work of the Union suffers from the lack of communication. There is no doubt that chemists are more prone to engage in IUPAC task forces and project groups when they feel included and are well informed about what is going on in the Union. A major goal of my presidency will be to implement measures that give more chemists the opportunity to become involved in IUPAC work. One arrangement that I can envision could include the association of one representative from each member country to each of the eight divisions; these groups of 44 representatives should be informed by mail or e-mail about the work being done in the division to which they belong. The members of these groups should have not only the right, but the obligation to give feedback to the relevant committee. This interaction should improve the quality of the work carried out in the divisions, and help to disseminate the results of IUPAC's scientific work. In addition,

this arrangement could give chemists from less active countries IUPAC experience that may eventually lead to an elected position in the Union.

Other arrangements could be thought of, and I would appreciate any suggestions. Ways to improve, or simply use, the existing channel of communications should not be ignored. This news magazine for instance is YOURS. No writers and full time editors fill up these pages. If you, your NAOs, ANAOs, or Associated Organizations have a short, interesting, and relevant story that will draw the reader's attention, please contact <edit.ci@iupac.org>. National magazines of chemical societies are in fact encouraged to reproduce or translate articles printed in *CI*.

Shortly, you will hear more about the proposed improvements and measures to be implemented that could be beneficial for IUPAC, its members, and the chemical sciences. 

... I found that the scientific work of the Union suffers from the lack of communication.

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

Camptothecin and Taxol

The Story Behind the Science

by *Nicholas H. Oberlies, Sharla Flora, and Anna L. Weaver*

On 23 April 2003, many researchers and friends gathered on the campus of Research Triangle Institute (RTI) International in Research Triangle Park, NC, for a ceremony designating the site as an American Chemical Society (ACS) National Historic Chemical Landmark. This honor recognizes the work of RTI's Natural Products Laboratory and its scientists Dr. Mansukh Wani, the late Dr. Monroe Wall, and their colleagues, whose dedication and innovation led to the discovery of the unique cancer-fighting compounds Taxol® and camptothecin™.¹ Present to laud these accomplishments were representatives of ACS and eminent researchers in the fields of natural products chemistry, cancer pharmacology, clinical oncology, and others.

As with many groundbreaking scientific developments, the stories behind the discoveries of Taxol and camptothecin are compelling. They provide more than good scientific narrative; these compounds have far-reaching impact both on individuals afflicted with cancer and on the field of natural products chemistry.

Intuition and Interest: Beginning with Camptothecin

Working for the U.S. Department of Agriculture (USDA), Dr. Wall spent much of the 1950s researching a large collection of plants, searching for phyto steroids that could serve as cortisone precursors. Fortunately, Dr. Wall had the foresight to save all the extracts from his studies. Later that decade, the

National Cancer Institute (NCI) launched a program to screen plants for anticancer activity. Of the 1000 samples Dr. Wall initially sent to NCI for testing, one demonstrated particularly promising anticancer activity: *Camptotheca acuminata*, a plant native only to China and Tibet, where it is known as xi shu ("happy tree").

Given its focus on agriculture, the USDA did not share Dr. Wall's interest in studying cancer-fighting plants. Therefore, with the promise of funding from NCI, Dr. Wall took his passion to the newly formed RTI. In 1962, Dr. Wall was joined by Dr. Wani—and a scientific partnership that would last over four decades was born.

RTI's Natural Products Laboratory acquired a large sample of *C. acuminata* and began work to isolate and determine the structure of the active agent. One of the more formidable challenges was to make a crystal suitable for X-ray analysis. In this area, among others, Dr. Wani demonstrated unusual skill. The research team persisted, and success came in 1966, when Dr. Wall, Dr. Wani, and colleagues published the isolation and structure elucidation of camptothecin.

This paper was their first publication on an anticancer compound from a plant source. Interestingly, Dr. Wall presented results at the annual meeting of IUPAC in Stockholm, Sweden, that same year. The seminal nature of this initial publication is rather remarkable, and it would lead eventually to camptothecin analogs used today in the fight against cancer.

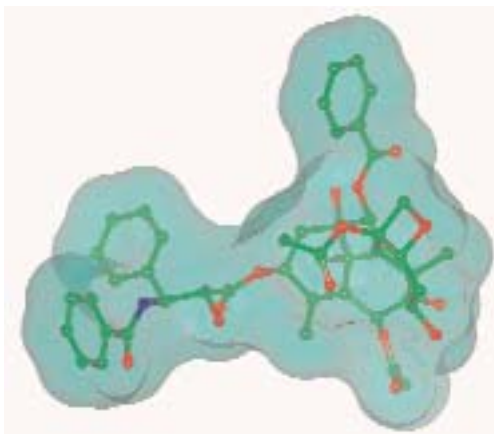
Another obstacle encountered by the research team involved the natural form of camptothecin. Specifically, its poor water solubility makes drug delivery extremely difficult. Clinical trials with camptothecin were initiated in the late 1960s using an analog (the sodium salt). Although this compound is quite water soluble, its anticancer activity is substantially diminished. Clinical trials were abandoned due to high toxicity and low efficacy, halting progress of camptothecin for more than a decade until its unique mode of action was discovered in 1985.

Lessons Learned: Early Years of Taxol Research

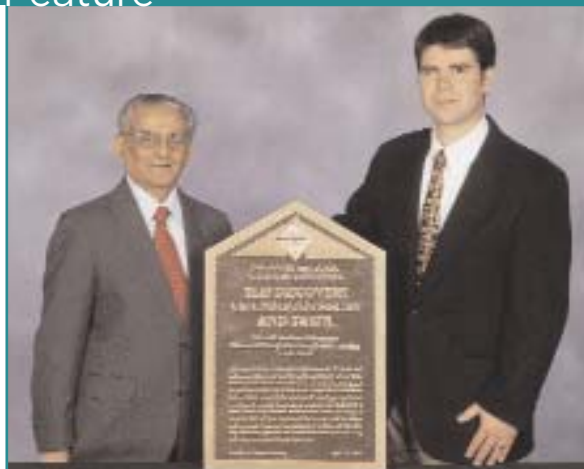
One of the early observations noted by Drs. Wall and Wani during their work with *C. acuminata* was a strong correlation between *in vitro* cytotoxicity and *in vivo* anticancer activity. Based on this insight, Dr. Wall

¹ Taxol, a word coined by Monroe Wall, is a registered trademark of Bristol-Myers Squibb. Camptothecin is a trademark of the Research Triangle Institute.

Source: S. Wayne Mascarella, Ph.D., of RTI



A modeller view of Taxol.



Dr. Wani (left) and Dr. Oberlies (article author) stand with a plaque designating the Research Triangle Institute a National Historic Chemical Landmark.

requested that RTI be assigned strongly cytotoxic plant extracts from the NCI. In contrast, other research groups shunned the cytotoxic extracts, wrongly presuming that general cytotoxicity would not lead to promising drug leads.

NCI's rationale for selecting plants to study is also a story worth mentioning: with limited funding for gathering samples, NCI chose to focus on sources available in the United States and on unique plants that had yet to be studied in depth; *Taxus brevifolia* met these qualifications. Thus, *T. brevifolia*, a species of yew tree that grows in the Pacific United States, was assigned to RTI for investigation.

By 1971, Drs. Wall and Wani had succeeded in isolating and determining the structure of the active compound from *T. brevifolia*, which they named taxol. Publication of their results would mark their sixth paper on a natural product with promising anticancer activity. Twenty years later, this compound would become a valuable weapon in the fight against cancer.

Failures, Perseverance, and a Late Correction

The structural characterization of camptothecin was certainly challenging, especially given the limited spectroscopic tools of the day. However, once a crystal suitable for X-ray analysis was prepared, the structure elucidation moved fairly rapidly. In contrast, the structure elucidation of Taxol was extremely difficult. The molecule had to be broken into parts—a large, complex core and a side chain. Even then, determining how the pieces were assembled based on X-ray structures of the parts was not straightforward.

At the time, camptothecin was advancing into early clinical trials. In addition, there were many other promising plants to study, while Taxol's structure remained elusive. At one point, Dr. Wall urged Dr. Wani to move on to other projects and to work on Taxol only as a low priority. Dr. Wani persisted, often on his own time, and his perseverance led to success. RTI researchers determined a tentative structure of Taxol in late 1970.

During one final experiment, as Wani and colleagues attempted to modify Taxol to increase its potency, they realized that the tentative structure was incorrect. They had misplaced the side chain. In the end, skill, determination, and luck came together for the greater good, and the research team corrected their error a scant few months before publication.

Solving the Problem of Supply

For naturally occurring substances such as Taxol and camptothecin, the question of supply can become central to their evolution into commercially available drugs. This is particularly true for Taxol, whose complex structure renders its total synthesis economically infeasible.

Taxol's supply problem remained until the late 1980s, when researchers found a way to extract a similar compound from the needles (a renewable resource) of another species of yew. That compound—10-deacetylbaccatin III—consisted of the complex core molecule of Taxol to which researchers successfully combined a synthetic version of the relatively simple side chain.

Yesterday's Novel Methods, Today's Best Practice

To isolate and characterize both camptothecin and Taxol, RTI researchers used a then-novel method known as bioactivity-directed fractionation. In this process, a promising plant extract is fractionated, and the fractions are tested for activity. This process is performed iteratively—further purifying the active fractions and retesting—until the active compound(s) is isolated.² Drs. Wall and Wani also pioneered the use of *in vitro* cytotoxicity as a predictor of *in vivo* efficacy. By using these bioassays to predict whether plant extracts or natural product compounds would have anticancer activity, they were

² In contrast, a phytochemical approach involves isolating numerous compounds from a plant without regard to bioactivity.

Feature

able to focus and accelerate their research toward new treatments. Today, these techniques are used routinely in natural products laboratories around the world to discover bioactive compounds from numerous sources, such as plants, marine life, fungi, etc.

Unique Mechanisms of Action

One of natural products research's greatest contributions is its ability to identify new ways to attack disease. For example, Taxol and camptothecin each act on cancer cells in ways that were unimagined prior to the compounds' discoveries. Both compounds inhibit tumor growth differently than all other known anticancer agents. Camptothecin impedes DNA replication by trapping a key enzyme, topoisomerase I. In contrast, Taxol stimulates the development of microtubules causing cells to be unable to coordinate cell division. Through very different mechanisms of action, both compounds lead to cancer cell death.

Taxol and Camptothecin Today

In the decades that followed the initial work of Drs. Wall and Wani, many researchers would prove instrumental in the development of successful cancer treatments from Taxol and camptothecin. Efforts to improve the methods for synthesizing the compounds and to reduce the side effects associated with the drugs are ongoing.

Today, Taxol is approved by the U.S. Food and Drug Administration for treatment of refractory ovarian cancer, metastatic breast and lung cancers, and Kaposi's sarcoma, while first-generation analogs of camptothecin (topotecan and irinotecan) are approved for treatment of ovarian and colorectal can-

cer. Today, one-third of all cancer treatments are derived from work in RTI's Natural Products Laboratory. Meanwhile, many other Taxol and camptothecin analogs are currently undergoing clinical trials and may yield new cancer-fighting drugs.


Recognizing the Impact

In recognition of their keen scientific intuition, their perseverance, and their incontrovertible achievements, Drs. Wall and Wani have received a number of prestigious accolades, including the 2000 Charles F. Kettering Prize. The most recent honor—designation of RTI's Natural Products Laboratory as one of fewer than 50 National Historic Chemical Landmarks—is particularly fitting for a scientific achievement of such singularity.

Taxol and camptothecin have prolonged and saved the lives of hundreds of thousands of cancer patients. Moreover, in the course of discovering these potent anticancer agents, researchers identified novel mechanisms of action for killing cancer cells, and the scientific community benefited from their new ideas and methods for finding and refining bioactive compounds from natural sources.

A Living Legacy

The resolve and innovation evident in the breakthrough research of Drs. Wall and Wani is a legacy that persists. Research into natural products has contributed 65% of today's anti-infective and anti-cancer drugs. In fact, fully 25% of the drugs in use today originated from sources in nature. Dr. Wani remains an active mentor in RTI's Natural Products Laboratory, where investigations in medicinal chemistry continue.

In addition to its active research efforts, RTI is working to ensure the Wall/Wani legacy by endowing fellowships in natural products research in their name, with the support of the American Society of Pharmacognosy and other private donors. Building on the accomplishments of the past 40 years, RTI will keep its Natural Products Laboratory at the forefront of the field, through research, mentoring, and fellowships, for the next four decades and beyond. 

The authors are all from the Research Triangle Institute, RTP, NC, USA. Nicholas H. Oberlies <oberlies@rti.org> is a research chemist (Ph.D.) at RTI's Natural Products Laboratory, while Sharla Flora and Anna L. Weaver are both editors/writers for the Institute.

 www.rti.org

Camptothecin and Taxol: Timeline

1960-1966	Isolation of active compound from <i>amptotheca acuminata</i> ; determination of structure of <i>camptothecin</i>
1962-1971	Isolation of active compound from <i>Taxus brevifolia</i> ; determination of structure of Taxol
1979	Determination of mechanism of action of Taxol
1985	Determination of mechanism of action of camptothecin
1988	Supply problem of Taxol abated via semisynthesis of Taxol
1992	FDA approval of Taxol for use in ovarian cancer, then subsequently breast and lung cancers and Kaposi's sarcoma
1996	FDA approval of two analogs of camptothecin for treatment of ovarian, lung, breast, and colon cancer

Striving for Open Access

Go online for references and links.

by Wendy Warr



The seminar on Open Access to Scientific and Technical Information, held in Paris in January 2003, dealt with an issue that could eventually impact all IUPAC members. This timely seminar—organized by INSERM, CNRS-INIST, and ICSTI, and supported by ICSU

and CODATA—explored the economic, political, and legal realities of the Open Access (OA) movement.*

What is Open Access, and why should it matter to IUPAC's Committee on Printed and Electronic Publications (CPEP)? According to David Prosser of the Scholarly Publishing and Academic Resources Coalition of Europe (an organization that aims to reduce the costs of access to learned publications), OA is a call for free, unrestricted access, on the public Internet, to the literature that scholars produce. It aims to accelerate research, enrich education, allow sharing of learning between richer and poorer nations, and enhance the return on taxpayer investment in research. These goals would be achieved by using existing funds to pay for dissemination rather than access.

In technological terms OA is described by Jack Franklin, in a background paper written for the conference, as an attempt to establish "common standards whereby articles stored on compliant servers can form a global library, allowing searching, data retrieval, cross-linking, and stable, long-term archiving." Until now, learned societies and commercial publishers have cornered the market for such facilities: publishing in refereed journals that have "high impact" is currently the key to recognition, tenure, and promotion for scientists. Since it would be prohibitively expensive to give all researchers in all countries access to all the information in up to 20 000 learned journals and countless databases, OA has been described as a technology for "giving the science back to the scientists" or allowing academia to take back control of scholarly communication.

Stevan Harnad, of Southampton University in the United Kingdom, was an early and exceedingly enthusiastic pioneer in this field. He claims that OA is not a

struggle against publishers or an attempt to replace them, but it is a parallel movement. It does not aim to solve the budgeting problems of libraries and give access to all in the Third World, although it might, as a side effect, do so. Instead, its main goal is to persuade scientists to mount their papers on institutional servers, giving access to all, so that the results may form the basis of further work and research may progress faster. Higher citation counts on the server would indicate the importance of articles and contribute to the prestige and upkeep of the institution.

Southampton University provides open archiving software called EPrints to help create open access to the peer-reviewed research output of all scholarly and scientific research institutions. Eprints is slowly gaining visibility, although institutional servers as recommended by Harnad have not proved as popular as discipline-based preprint servers such as the well known ArXiv for physics and related sciences. A Chemistry Preprint Server was launched more recently.

Preprints are not peer reviewed but OA peer-reviewed journals are also beginning to appear. For example, all the original research articles in the journals published by BioMed Central are immediately and permanently available online without charge or any other barriers to access. Public Library of Science has recently announced that it will launch two OA journals.

The concept of OA is of particular importance to scientists in the developing nations. A so-called North-South knowledge gap is caused by the high cost of published refereed literature and a South-North gap by the high costs of local journal production and prejudices at mainstream northern journals. As a result, researchers are unable to get research published and cannot form partnerships with researchers abroad. This is most serious in disciplines where a global picture is required, such as AIDS, infectious diseases, and environmental protection.

In response to a World Health Organization (WHO) poll, scientists in 130 such countries expressed three needs. First they want access to journals such as *Nature* and *The Lancet*. Second, they want to be recognized by publishing in the top international journals; they need international recognition in order to get funding. Third, they need help with duplicate publishing: they need to publish in both local and international journals. The first need had the highest priority so WHO tackled it first in the Health InterNetwork Access to Research Initiative, said Barbara Aronson of the WHO.

Those who do not see journals, do not publish in them. They are not peer reviewers. They do not go to

*INSERM is the French Institute of Health and Medical Research, CNRS is the Centre National de la Recherche Scientifique, INIST is the Institut de l'Information Scientifique et Technique, ICSTI is the International Council for Scientific and Technical Information, ICSU is the International Council for Science, and CODATA is the Committee on Data for Science and Technology.

Feature

meetings. Any price is too high for these scientists. They work with a sense of isolation. The poorest 75 countries have a GNP of less than USD 1000 per capita per year. A further 47 have GNP of USD 1000—3000. At the other end of the scale (represented by the audience in Paris), 20 countries have a GNP per capita of greater than USD 25 000. The lower the GNP, the higher the level of disease. In the 75 poorest countries, 56% of medical institutions have no subscriptions to journals and 21% have only 2 print subscriptions. In the next 47 countries, 34% of medical institutions have no print subscriptions and 34% have only 2 subscriptions.

In the 75 poorest countries, 56% of medical institutions have no subscriptions to journals and 21% have only 2 print subscriptions.

So, WHO has worked with leading Internet publishers to provide access for the Third World through the HINARI project. Some 2100 journals are offered online access through a user-friendly interface. HINARI has offered free access in 69 of the poorest countries since January 2002. In January 2003, low-price access (USD 1000 per institution per year) was offered to a further 43 countries. As of January 2003, 438 institutions in 56 countries have taken up the free service and 247 institutions in 32 countries have low-price access.

Another initiative aimed at the developing world is that of the International Association for the Promotion of Cooperation with Scientists from the New Independent States of the Former Soviet Union. The organization's International Network for the Availability of Scientific Publications and the Program for the Enhancement of Research Information provide funding to facilitate online access to full-text journal databases, offer electronic document delivery services, and train scientists in information and communication technologies.


Kay Raseroka of Botswana, president-elect of the International Federation of Library Associations and Institutions led a panel discussion on how to ensure that developing nations can participate in OA initiatives. The panelists emphasized visibility, raising awareness, and training as part of the solution. It was pointed out that the Open Society Institute is negotiating national licenses and arranging training in some countries. According to the panelists, infrastructure, capacity, and bandwidth need to be developed; per-

manent local structures must be put in place; and durability and sustainability are important.

Sally Morris of the Association of Learned and Professional Society Publishers discussed the economics of publishing. As she pointed out, the many processes involved in publishing are expensive. Unfortunately, electronic publishing does not reduce costs as much as some people think, she said.

Pieter Bolman of Elsevier questioned whether the OA approach was any better than the current model. According to Bolman, the proposed "author pays" business model means that library funds have to be rechanneled to authors. Authors do not like page charges and libraries may resent further budget cuts. As Bolman sees it, the OA model favors rich authors and there is no proof of its sustainability.

Intellectual property issues were also discussed. Thomas Dreier of New York University concluded that information policy is largely influenced by the economic concerns of global players and copyright should not be held responsible for unsolved issues of information policy. Paul Uhlir of the National Academy of Sciences spoke of moving from intellectual property to "intellectual commons." Although researchers do want recognition, their motivation is mainly rooted in intellectual curiosity. Peer production (as in Project Gutenberg and NASA's Clickworks) is not dependent on monetary reward, but on intellectual commons, he said.

A political issue is that major research budgets do not take account of the costs of the dissemination of results or the building of databases. Indeed, researchers themselves often do not understand the costs and complexities of disseminating the results of their research as evidenced by some of the project proposals that CPEP examines. Many of the issues surrounding OA and its economic models are still controversial and unresolved. Even learned societies, and committees such as CPEP, have to face the fact that society programs are to some (large) degree dependent on publishing income. There is, as they say, no such thing as a free lunch. 

Wendy Warr <wendy@warr.com>, of information consultants Wendy Warr & Associates <www.warr.com> is chairman of IUPAC's Committee on Printed and Electronic Publications and IUPAC representative on ICSTI. She was the IUPAC representative to the seminar on Open Access to Scientific and Technical Information.

 www.iupac.org/standing/on/icsti

Chemical Weapons Convention

First Major Review Completed

In 2002, IUPAC organized a workshop and later prepared and published a technical report on the Impact of Scientific Developments on the Chemical Weapons Convention. The timing of that project was planned to ultimately coincide with the first quinquennial review of the 1997 Chemical Weapons Convention. IUPAC Secretary General E. D. Becker and Vice President L. Sydnes represented the Union, which had an observer status at the Review Conference held in late April–early May 2003.

by Edwin D. Becker



Delegates from the 151 States Parties to the Chemical Weapons Convention (CWC) assembled in The Hague, Netherlands, for two weeks (April 28 to May 9) to review the first six years of this treaty that is “determined for the sake of all mankind, to exclude completely the possibility of the use of chemical weapons.” Also present

were observers from about 20 nongovernment organizations, including IUPAC.

The Review Conference addressed questions regarding the timely destruction of all declared chemical weapons, implementation by States Parties of legislation to make any breach of the Convention a crime, more resource-efficient means to stem the proliferation of chemical weapons, and ways to enhance the peaceful uses of chemicals among States Parties.

The conference provided a strong reaffirmation of the importance of the treaty. Ambassador Rogelio Pfirter, director general of the Organization for the Prohibition of Chemical Weapons (OPCW) stated, “Let us convey the message loud and clear that in the fight against weapons of mass destruction the overwhelming majority of the international community stands firmly united behind the Chemical Weapons Convention.”

Underlying the discussions was the recognition that advances in science and technology will materially affect future implementation of the treaty—a point that IUPAC has emphasized in its report to OPCW and the States Parties (see article on page 10). In opening addresses at plenary sessions, several delegates referred to scientific and technological issues. Ambassador Priscilla Jana (South Africa) said, “We are satisfied with the report of IUPAC on the impact of sci-

entific developments on the Chemical Weapons Convention. Among its conclusions, this report states that although newer technologies, such as the advances in biomolecular science and in chemical synthesis, must be under regular review, they do not materially change the situation regarding the risks to the Convention by toxic chemicals that are not listed in the Schedules.” Other delegates pointed out informally that the report by IUPAC was the first by an international scientific organization to address such issues for any of the several international arms control treaties.

The CWC entered into force in 1997 and mandated the OPCW to eliminate chemical weapons forever. OPCW inspectors monitor and verify the destruction of all declared chemical weapons and the destruction or conversion of all declared chemical weapons production facilities. The OPCW monitors global chemical industry to ensure that no new chemical weapons are produced, and it promotes the peaceful uses of chemistry. Each Member State has the right to receive assistance and protection from OPCW if threatened by or attacked with chemical weapons.

The CWC now serves over 90% of the global population, and over 98% of global chemical industry is subject to its verification regime. Five States Parties have declared—and are obligated to destroy—over 70 000 metric tons of chemical warfare agent filled into 8.6 million munitions and containers. These chemical weapons have been entirely inventoried and are reinspected systematically to provide confidence that there has been no loss or diversion of these weapons awaiting destruction. Over 10% of chemical warfare agents and over 25% of the munitions containing these agents have already been destroyed under continuous verification by OPCW.

Progress in the destruction of global chemical weapons production capacity has also been significant. All declared chemical weapons production facilities have been deactivated. Over two-thirds of the declared chemical weapons production plants have either been destroyed or converted to peaceful purposes. In the past six years, over 880 inspections have been undertaken at more than 160 chemical weapons related sites around the world. In addition, since 1997, the OPCW has conducted a total of over 550 inspections at over 445 industrial facilities on the territory of 52 States Parties.

Further information on the CWC is available at <www.opcw.org>.

continued on page 10

IUPAC Briefs Delegates to CWC

On 1 May 2003, IUPAC completed a two-year project to advise the Organization for the Prohibition of Chemical Weapons (OPCW) by briefing delegates to the First Review Conference of the Chemical Weapons Conventions in The Hague, Netherlands. The presentation drew on findings from the IUPAC Workshop on Impact of Scientific Advances on the Chemical Weapons Convention, held in Bergen, Norway, in July 2002.



A plenary session of the First Review Conference at the Netherlands Conference Center in The Hague.

Dr. Christopher K. Murphy (U.S. National Research Council), who had served as coordinator of the IUPAC workshop, made the presentation. The IUPAC briefing highlighted four key issues:

1. **Technical Challenges to the CWC.** New synthetic methods (including biosynthesis) provide novel routes to toxic chemicals that were not envisioned when the CWC was negotiated over a decade ago. In addition, globalization of the chemical industry has resulted in an increased number of modest size batch facilities in many countries that could be used for illicit purposes. Future developments in using database mining to search for toxic effects in new chemicals and introduction of microreactors, which have little resemblance to normal chemical plants, pose additional risks. Ongoing efforts by the industry to mandate responsible handling of toxic substances may alleviate these risks, but IUPAC pointed to the need for the OPCW

Technical Secretariat to remain abreast of current developments in order to recognize the potential for misuse during inspection of worldwide chemical production facilities.

2. **Advances in Analytical Techniques.** Counterbalancing the challenges posed by improved synthetic methods are advances in analytical chemistry that provide more sensitive ways to detect small amounts of toxic substances. IUPAC urged that the Technical Secretariat be equipped with smaller, lighter, and more portable instruments, such as GC/MS (gas chromatograph/mass spectrometer), which are currently available, and to acquire newer instruments that do not require sampling (e.g., portable isotopic neutron spectrometers). The workshop also identified trends in analytical methods that will provide future instrumental methods, such as "lab on a chip" technology and immunoassays. IUPAC noted that with continually improving instrumental sensitivity, agreement is needed on a practical "zero" to indicate absence of a substance.

IUPAC urged that the Technical Secretariat be equipped with smaller, lighter, and more portable instruments

3. **Technical Capability of the Secretariat.** Continuing professional development of the Technical Secretariat is essential to increase awareness of new chemicals and production techniques, to take advantage of advances in analytical methods, and to make intelligent investments in new equipment. IUPAC urged OPCW to provide adequate resources to ensure that the Secretariat retains and enhances its technical capabilities. Regular seminars and training sessions are needed.

4. **Education and Outreach.** There is a need for greater worldwide understanding and appreciation of the CWC and its impact. IUPAC urged that the OPCW Secretariat and the National Authority in each of the 151 States Parties work together with national and international scientific organizations

Review Conference

and with chemical industry associations to improve education and outreach to the worldwide scientific community. IUPAC and other scientific organizations should continue to assist OPCW and its States Parties by advising on continuing advances in relevant science and technology and by recommending experts who could be called on as needed.

IUPAC and other organizations emphasized that a principal strength of the treaty lies in the *general purpose criterion*. The CWC totally prohibits the development, production, acquisition, stockpiling, or retention of chemical weapons. However, in order to promote the peaceful uses of chemicals, it defines chemical weapons, in part, as “toxic chemicals and their precursors, *except where intended for purposes not prohibited under this Convention, as long as the types and quantities are consistent with such purposes.*” The italicized phrase focuses on the purposes of handling chemicals. It thus permits the CWC to be applied to any substances developed in the future, not only those chemicals that were specifically listed in the treaty, but prevents the treaty from being misapplied to chemicals, however toxic, intended for peaceful purposes.

The briefing, presented at the Peace Palace in The Hague, was part of an Open Forum designed to allow IUPAC and other nongovernmental organizations to address issues outside the formal sessions of the Review Conference. Ambassador Rogelio Pfirter, director gen-



Chris Murphy presenting the IUPAC report to the Open Forum of Non-Governmental Organizations, 1 May 2003



The Peace Palace in The Hague, Netherlands, site of the Open Forum of Non-Governmental Organizations

eral, OPCW, opened the Forum by noting the importance of information about scientific and technical advances, the role of the international chemical industry, legal issues, and the status of destruction of world chemical weapons stockpiles. The Forum also included an in-depth discussion of the implications of the use of nonlethal chemical weapons, such as riot-control agents.

The IUPAC briefing followed a formal report to the director general of OPCW, which was later published in *Pure and Applied Chemistry* **74**, 2323–2352 (2002). Director General Pfirter commented favorably on the report and briefing in conversations with IUPAC Vice President Leiv Sydnes and myself, who represented the Union at the Review Conference. He recognized the utility of continuing independent scientific advice to augment OPCW’s own Scientific Advisory Board and expressed hope that IUPAC would encourage dissemination of information about the CWC and the work of OPCW. 🌐

Edwin D. Becker <tbecker@nih.gov> has been IUPAC secretary general since 1996 and has been a member a various IUPAC bodies for 30 years. He is presently a scientist emeritus at the National Institutes of Health, Bethesda, MD, USA.

IUPAC Announces Prize Winners

On 30 April 2003, IUPAC announced the winners of the IUPAC Prize for Young Chemists, which is an award for the best Ph.D. thesis in the chemical sciences as described in a 1000-word essay. The winners are as follows:

- Roman Boulatov, Stanford University, CA, USA
- Gonzalo Cosa, University of Ottawa, Canada
- Martin Trent Lemaire, University of Victoria, Canada
- Christoph Schaffrath, University of St. Andrews, Scotland
- Kaihsu Tai, University of California, San Diego, CA, USA

The winners will each receive a cash prize of USD 1000 and a free trip to the IUPAC Congress, 10–15 August 2003, Ottawa, Canada. Each prize winner will also be invited to present a poster at the IUPAC Congress describing his/her award winning work. The awards to the five winners of the 2003 prize and those of 2002 will be made during the Opening Ceremony of the Congress. The essays describing the winners' theses, which can be found on the IUPAC Web site, cover a wide range of subject matter.

There were 34 applicants from 13 countries. The Prize Selection Committee was comprised of members of the IUPAC Bureau with a wide range of expertise in chemistry. The committee was chaired by Dr. Alan Hayes, IUPAC past president.

In view of the quality of many applications, the Committee decided also to give three Honorable Mention Awards:

- S. Nagendran, Indian Institute of Technology-Kanpur
- Vincent Semetey, Louis Pasteur University, Strasbourg, France (currently at Harvard University, MA, USA)
- Lei Wang, University of California, Berkeley, CA, USA (currently at University of California in San Diego, CA, USA)

The Honorable Mention Award winners will receive a cash prize of USD 100 and a copy of the *Compendium of Chemical Terminology*, the IUPAC "Gold Book."

Applications for the 2004 Prize are now being solicited, as described at www.iupac.org/news/prize.html.

 www.iupac.org/news/prize/2003_winners.html

Welcome to Ottawa!

On behalf of the Organising Committee for the Meeting, I am delighted to welcome you to Ottawa to this special joint Congress of IUPAC and the Canadian Society for Chemistry.

The theme of the conference, Chemistry at the Interfaces, was chosen to showcase the interactions both between the various sub-disciplines of chemistry and the interfaces with other areas of science. I believe we have put together a very strong scientific program and an eminent list of speakers. Each morning will begin with a lecture by one of our five internationally recognized plenary lecturers. The program consists of over 50 symposia in more than 160 sessions, and is both international in scope and broad in range. One focus of the program concerns aspects of chemistry related to societal issues. There will be technical sessions on environmental quality and on green chemistry. Three symposia, open to the public, will explore the public understanding of chemistry, and examine information flow to the public through the media, from research laboratories, and by government agencies.

In addition, I am pleased to welcome 93 young scientists from 45 countries, including nine IUPAC prize winners for Ph.D. dissertations, all of whom have been awarded partial support to enable them to present their results.

A meeting of this scope, with over 2100 abstracts, requires the voluntary assistance of many people. I have been ably supported by an executive committee, representing various constituencies, that has worked extremely hard to liaise with sub-committees, symposium chairs, etc., to organize such an extensive program. It is also my pleasure to recognize the support and cooperation of both IUPAC and the Canadian Society for Chemistry.

I hope all participants will find the meeting rewarding and that there will be opportunities to experience and enjoy some of the many amenities that Ottawa has to offer.



Alex McAuley

President of the joint 39th IUPAC Congress and 86th Conference of the Canadian Society for Chemistry

 www.iupac2003.org

Highlights of the Executive Committee Meeting

IUPAC's Executive Committee (EC) meets once a year to ensure the orderly discharge of the functions of the Union. In 2003, the EC Meeting was held 5–6 April in Bergen, Norway. The EC comprises the IUPAC officers, namely the president, vice president, past president, secretary general, treasurer, and three elected members, currently Oleg Nefedov, Hitoshi Ohtaki, and Ed Przybylowicz. IUPAC Executive Director John Jost acts as secretary of the EC.

At the recent meeting, the EC examined a few important proposals in anticipation of the Council Meeting of this coming August in Ottawa. Some of the most significant actions are described below.

Proposal to Reorganize the Governance of the Union

The EC examined and approved the report of the Governance Structure Committee (GSC), which makes two major proposals for changes in the governance of IUPAC:

1. creation of a new body tentatively called the Union Policy Committee, which would have one representative from each National Adhering Organization (NAO) and would provide input on policy issues to the new Executive Board
2. replacement of the Bureau and Executive Committee with a new body to be called the Executive Board, which would be composed of the five officers and four members elected by Council

The GSC report has been sent to the IUPAC NAOs for detailed study and comment. The proposals in the report will be voted on at the Council meeting in Ottawa.

Proposal to Bill National Subscriptions in National Currencies

By a resolution passed by Council in 2001, a Working Party on National Subscriptions, chaired by Christoph Buxtorf, was appointed to investigate National Subscriptions. The Working Party has designed an ingenious method of calculating National Subscriptions. It is still based on chemical turnover; however, it takes cognizance of the exchange rates of the national currencies of the member countries. The EC examined the proposed procedure and concluded that it could be quite beneficial to NAOs in managing their funds and is

unlikely to have a significant long-range impact on the Union's finances. The EC referred the proposal to the Council meeting in Ottawa for action.

Applications for New Associated Organizations

The EC recommended to the Council that the applications of the following organizations for Associated Organization Status be approved:

- International Plasma Chemistry Society
- International Association of Chemical Thermodynamics
- Southern and Eastern Africa Network of Analytical Chemists

In addition, the EC recommended that the Council approve the revised Constitution of the International Association of Catalysis Societies, a current Associated Organization.

Conference Support

The EC recommended to the Council the approval of the new program of support for conferences on new directions in chemistry and conferences in developing countries. The new program would replace the existing separate programs and would change the approval and review procedures. Details can be found at www.iupac.org/symposia/support.html.

Revised Fund Policy and Investment Policy Statements

The Finance Committee, which meets each year in February or March, has revised its fund and investment policy statements to clarify the treatment of donations as endowment contributions. The EC approved the revised statements; these are available on the IUPAC Web site at www.iupac.org/standing/fc.html.

2004–2005 Budget

The EC approved the budget proposed by the Finance Committee and recommended approval by the Council. The proposed budget increases total National Subscriptions by only 1%. The budget is in balance with a total expense and revenue of USD 2.57 million for the biennium. The 2004–2005 budget will also include the allocation of USD 20 000 to the Committee on Chemistry Education for use in funding projects.

Location of Congress/General Assembly for 2007

The EC approved the application of the Italian

National Adhering Organization, Consiglio Nazionale delle Ricerche, to host the 2007 IUPAC Congress and General Assembly in Turin, Italy. The plans of the Consiglio Nazionale delle Ricerche will be presented to the Council Meeting in Ottawa; approval will then be voted on by the Council.

In 2004, the EC will meet in early April in Bangalore, India, accepting an invitation of the Indian NAO. The minutes of the EC meeting are available on the IUPAC Web site. Questions/comments should be addressed to the executive director at <secretariat@iupac.org>.

 www.iupac.org/news

The IUPAC Council will elect new officers at its meeting in Ottawa, 16–17 August 2003. Nominations for the various positions are presented on page 16.

IUPAC Funds Three Conferences to be Held in 2004 in Developing and Disadvantaged Countries

As part of its ongoing commitment to support chemistry and chemistry education in developing and economically disadvantaged countries, IUPAC recently approved funding for three innovative and compelling conferences:

- [International Conference on Biodiversity and Natural Products](#), 26–31 January 2004, New Delhi, India
- [International Symposium on Chemistry and Biological Chemistry of Vanadium](#), 3–5 September 2004, Szeged, Hungary
- [Chemical Sciences in Changing Times: Visions, Challenges, and Solutions](#), 18–24 July 2004, Belgrade, Yugoslavia

The IUPAC program of support for conferences was first implemented in 2000, but was revised earlier this year to enlarge its scope and to favor innovative topics. For more details on the current program, see the secretary general's column in the March–April 2003 issue of *CI*, or <www.iupac.org/symposia/support.html>.

The International Conference on Biodiversity and Natural Products will be the first joint meeting of the

International Conference on Biodiversity and the International Symposium on the Chemistry of Natural Products. Leading researchers from all over the world will discuss present and future needs for mutually advantageous international cooperation in the appropriate, sustainable, and innovative utilization of bio-resources. Significant interest had been expressed in combining, in India, the more recent conference series on biodiversity with the long-standing IUPAC-sponsored conference on natural products.

The 4th International Symposium on Chemistry and Biological Chemistry of Vanadium, a relatively new symposium series comes back to Europe for its fourth year. The list of plenary lecturers is representative of the international diversity of the symposium, and tentatively includes V. Pecoraro (USA), A. Butler (USA), T. Hirao (Japan), D. Garner (UK), K. Wiegardt (Germany), D. Rehder (Germany), H. Sakurai (Japan), Y. Shechter (Israel), V. Conte (Italy), R. Wever (Netherlands), and R. Eady (UK). The symposium will cover the biological aspects of vanadium chemistry, the inorganic chemistry of vanadium, and vanadium chemistry in catalysis and organic synthesis.

Nearly 600 participants are expected at the 4th International Conference of the Chemical Societies of the South-Eastern European Countries on Chemical Sciences in Changing Times: Visions, Challenges, and Solutions. This conference will address issues related to chemistry education and will commemorate the 150th anniversary of chemical education in Serbia. The scope of the conference will be general and will include a focus on advanced materials and life sciences.

 www.iupac.org/news/archives/2003/conf-support.html

Bio-Unions to Pursue Science for Health and Well-Being

In February 2003, Dr. Kallner, president of the IUPAC Division on Chemistry and Human Health, participated in a “brainstorming” meeting in Paris at which 13¹ bodies of the International Council for Science (ICSU) developed a plan to “empower the science community, policy makers, and the public in all countries with the knowledge base to effect their health and well-being.” Recognizing that the health sciences require the partnership of a broad range of sciences and technologies to advance human health and well-being, the initiative is a collaborative effort among ICSU Unions and other ICSU bodies.

Under the leadership of Prof. Marvelee Wake of the International Union of Biological Sciences, the participants developed a draft document along three *core domains*: living environments, connections between water and health, and the impacts of technology. They also identified topics of focus, potential Unions to be involved, desired outcomes, and target audiences.

Broadly, the "Science for Health and Well-Being" initiative aims to accomplish the following:

- demonstrate the extent to which science and technology are important to health and well-being
- provide education (at multiple levels) about science and technology using modern means of communication
- collaborate to produce new ideas and to develop science and technology partnerships
- develop an inventory of ongoing activities to identify unmet needs

"The next steps include seeking additional alliances within and beyond ICSU, promoting conjoint events at Union conferences, and compiling information," says Chair Marvelee Wake. "We also recommend that ICSU make this subject a primary focus for funding in 2005."

¹International Union of Biological Science, International Brain Research Organization, International Geographical Union, International Union of Geodesy and Geophysics, International Union of Nutritional Sciences, International Union of Pure and Applied Chemistry, International Union of Physical and Engineering Sciences in Medicine, International Union of Physiological Sciences, International Union of Psychological Science, International Society for Photogrammetry and Remote Sensing, Scientific Committee on Problems of the Environment, and DIVERSITAS

For more information, contact Anders Kallner <anders.kallner@ks.se>.

Methods of Analysis and Sampling of Food Products

The 15th Inter-Agency Meeting (IAM) of international organizations working in the field of food product analysis and sampling and associated quality assurance measures was held in Budapest, Hungary, in November 2002. The aim of the IAM is to promote cooperation among organizations working in this sector and to support the needs of the Codex Alimentarius Commission. The IAM provides a unique opportunity for these organizations to discuss common problems and to harmonize their approaches.

Among the major subjects discussed at the meeting were the following:

- review of actions taken by Codex in response to the results of the 14th IAM meeting and other actions by Codex affecting IAM
- discussion of IAM's role and involvement in issues relating to quality assurance in food analysis
- effects of proficiency testing
- the AOAC project on developing an electronic compendium of analytical methods

A report on the meeting by Dr. A. Fajgelj, IUPAC representative, can be read online at the link below.



www.iupac.org/standing/on/iam



Your News in the Wire

CI is seeking articles for its IUPAC Wire section.

Articles should be submitted no later than two months before the issue date.

Contact the editor for more information at <edit.ci@iupac.org>.

IUPAC Elections

Nominations for the various positions that fall vacant at the end of 2003 must be received by the Secretary General at the IUPAC Secretariat before 15 June 2003, (i.e., two months before the start of the 42nd IUPAC Council Meeting). Prof. Leiv K. Sydnes (Norway), vice president and president-elect, becomes president on 1 January 2004. On that date, Prof. Pieter S. Steyn (South Africa), current president, will become past president and remain an officer and a member of the Bureau for a period of two years. See Web site for final document <www.iupac.org/news/archives/2003/42nd_council>. The candidates—as of 1 May 2003—for each position are listed below:

IUPAC Elections Ballot

Vice President

- Hitoshi Ohtaki (Japan)
- Robert G. Gilbert (Australia)
- Bryan Henry (Canada)

Secretary General

- David StClair Black (Australia)
- John Corish (Ireland)

Treasurer

- Christopher F. Buxtorf (Switzerland)

Bureau

- Bryan Henry (Canada)
- Anders Kallner (Sweden)
- Werner Klein (Germany)
- Nicole Moreau (France)
- Oleg Nefedov (Russia)

Hitoshi Ohtaki (Japan)



Prof. Ohtaki's research interests cover various areas of solution chemistry and coordination chemistry, especially structural chemistry of solutions, including solvents, solvated ions, and complexes existing in solution by means of solution X-ray diffraction.

Recently, he has focused on structural studies of supercritical water and other liquids and solvation structures of ions in supercritical fluids. He has been determining structures of short-lived reaction intermediates by the stopped-flow-EXAFS method developed by his group.

Education and Career

Prof. Ohtaki obtained M.S. and Ph.D. degrees in 1957 and 1961, respectively, from Nagoya University. From 1961 to 1964 he was a postdoctoral research fellow at the Royal Institute of Technology, Stockholm, Sweden.

Following are just a few highlights from Ohtaki's illustrious career, which began in 1959. He was director of the Coordination Chemistry Laboratories of the Institute for Molecular Science of the Okazaki National Research Institute, dean of the School of Mathematical and Physical Science of the Graduate University for Advanced Studies, director of the Institute of Science and Engineering at Ritsumeikan University. In 1993 he was named emeritus professor of the Tokyo Institute of Technology and the Graduate University for Advanced Studies. In March 2003 he retired from Ritsumeikan University where he had been a professor since 1993 and director of the Institute of Science and Engineering since 1994. Over the course of his career Ohtaki has served as a visiting professor in Sweden, Austria, Thailand, and the Philippines.

IUPAC Involvement

Prof. Ohtaki was a member of the Commission on Equilibrium Data (V.6) of the Analytical Chemistry Division of IUPAC from 1975 to 1993 (associate member, 1975–79; titular member, 1979–85; secretary, 1981–83; chairman, 1983–85; national representative, 1985–89; and coopted member, 1989–93). He was also a member of the Inorganic Chemistry Division from 1987 to 1991. He is currently a Bureau member of IUPAC, as well as a member of the Executive Committee. Recently, he was chairman of the

Vice President

The vice president to be elected at the 42nd Council Meeting will be president-elect, and will become president on 1 January 2006. Nominations for vice president received (as of 1 May 2003) are as follows:

- Prof. Hitoshi Ohtaki (Japan)
- Prof. Robert G. Gilbert (Australia)
- Prof. Bryan Henry (Canada)

Committee on Conferences in Developing Countries and of the Membership Development Committee.

Related Professional Activities

Prof. Ohtaki has served as president of the Science Council of Japan, Federation of Asian Chemical Societies, the Japanese Society of Coordination Chemistry, and the Association of Japanese Solution Chemists. Currently he is the chairman of the Committee for International Affairs of the Chemical Society of Japan.

For three decades Ohtaki has been organizing and leading major international chemistry conferences. Most recently he was chairman of the International Organizing committee for the 12th Eurasia Conferences on Chemical Sciences held in Karachi, Pakistan, in 2002.

Ohtaki has published more than 300 research papers and reviews. He has authored and coauthored five books and edited and coedited three books. His book *Chemistry of Reactions in Solutions* has been translated into Chinese. Ohtaki is also a member of the editorial boards of the *Journals of Molecular Liquids*, *Solution Chemistry*, *the Brazilian Chemical Society*, and *the Malaysian Chemical Society*.

Awards

Prof. Ohtaki received the Matsunaga Prize in 1976, the Tejima Memorial Award in 1989, the Takei Prize of the Electrochemical Society of Japan in 1990, the National Medal of Purple Ribbon in 1995, and the Prize for Scientific Merits of the Electrochemical Society of Japan in 2000. In 2002, Ohtaki was awarded the 17th M. H. Khundkar Memorial Lectureship (University of Dhaka, Bangladesh) and he was named Honorary Professor of St. Petersburg University, Russia, and a Honorary Member of the Japan Society of Coordination Chemistry.

Robert G. Gilbert (Australia)



Prof. Robert (Bob) Gilbert's research interests are in the areas of chemical dynamics and in the fundamentals and applications of the formation and properties of polymer colloids. He developed theories to understand the pressure dependence of unimolecular reactions, including models for collisional energy transfer and for microscopic rate coefficients for barrierless reactions. His 1990 book on the theory of uni-

molecular reactions is regarded as the definitive authority in that field. In polymer colloids, his work includes the development of the means, using appropriately designed experiments, of determining rate coefficients for individual processes in these complex heterogeneous systems, and then using these data to determine the dominant mechanisms. His book on this topic, published in 1995, is regarded as a landmark. His research has since broadened to look at polymer colloids in natural systems, and to bridge the gap between chemical and chemical engineering sciences in the manufacture of industrial products. He consults widely with multinational industry.

Education and Career

Prof. Gilbert received his bachelor's degree from the University of Sydney and completed his Ph.D. at the Australian National University, Canberra, in 1970. After two years of postdoctoral research at MIT (Cambridge, MA, USA), he returned to the University of Sydney where he holds a Personal Chair in Polymer Chemistry.

IUPAC Involvement

He has served IUPAC in many capacities, including creating and leading a Working Party on polymerization kinetics. He was also president of the Macromolecular Division (1998–2001), convener of the IUPAC "New Directions" Summit in Singapore (1997), a member of the IUPAC Strategy Development and Implementation Committee in 1997, and co-chair of the IUPAC Scientific Congress in 2001. He was elected a Bureau Member for the period 2002–2005. He is currently serving on both the Evaluation Committee and the Membership Development Committee.

Related Professional Accomplishments

He has supervised 50 Ph.D. and M.S. students and 25 postdoctoral fellows. Gilbert serves on the editorial board of several major polymer journals and is the author of two books, four patents, and 270 papers.

Awards

Gilbert received an Excellence in Teaching Award at the University of Sydney in 1990. Other awards include both the Polymer and Physical Chemistry Medals, and the Smith Medal, of the Royal Australian Chemical Institute. In 1994, he was elected a Fellow of the Australian Academy of Science.

IUPAC Elections

Bryan Henry (Canada)



The central theme of Prof. Henry's research concerns the experimental and theoretical study of highly vibrationally excited molecules. Dr. Henry has maintained a distinguished and active research career and is recognized as one of Canada's leading physical chemists. Dr. Henry is enthusiastically involved in the activities of IUPAC in Canada and abroad. He has been particularly active in trying to create interactions between universities and industry.

Education and Career

Professor Henry received his B.S. in 1963 from the University of British Columbia and his Ph.D. from Florida State University in 1969. He started his academic career at the University of Manitoba, and in 1987 moved to the University of Guelph where he became chairman of the Department of Chemistry and Biochemistry. Since 2003 he has been acting dean of the College of Physical and Engineering Science.

Occasionally over the last 25 years, he has been visiting professor at the Australian National University, the Institute for Molecular Science in Okazaki, Japan, and the University of British Columbia.

Not only has Henry chaired two chemistry departments in two of Canada's major universities, but he served as chair of the Chemistry Department Chairs of Ontario Universities. He has served as president of the Chemical Society of Canada and as chair of the Chemical Institute of Canada, of which he is also a fellow. He currently chairs the Canadian National Committee for IUPAC and is scientific program chair of the 2003 IUPAC International Congress which will be held in Ottawa in August 2003.

Related Professional Activities

Henry has also served in a number of other capacities, including on the Editorial Advisory Board of the *Canadian Journal of Chemistry*, on the Selection Committee for the Canadian Science and Engineering Hall of Fame, as a member of the Natural Sciences and Engineering Research Council Chemistry Grant Selection Committee, and more. In addition, he has authored or co-authored over 100 research papers.

Awards

Prof. Henry has earned a number of honors, including the Gerhard Herzberg Award of the Spectroscopy

Society of Canada for Outstanding Contributions to the Science of Spectroscopy, the LesSueur Memorial Award from the Society of Chemistry Industry, and the Montreal Medal from the Chemical Institute of Canada.

Secretary General

Secretary General

Dr. Edwin D. Becker (USA), the present Secretary General, completes eight years (1996–2003) of service and is not eligible for re-election. Nominations for Secretary General received (as of 1 May 2003) are as follows:

- Prof. David StClair Black (Australia)
- Prof. John Corish (Ireland)

David StClair Black (Australia)



Prof. David StClair Black has made major contributions in the areas of heterocyclic chemistry, coordination chemistry, and natural products. These include a book (together with J. M. Swan) entitled *Organometallics in Organic Synthesis*, and approximately 250 research papers.

Education and Career

Prof. Black received his B.S. and M.S. degrees in chemistry at the University of Sydney. He then undertook a Ph.D. in Cambridge from 1960–1963, working with Professor Lord Todd. He was a postdoctoral associate with Prof. Thomas Katz at Columbia University (1963–1964) before taking up a lectureship in Chemistry at Monash University in 1965. He was appointed to the chair of Organic Chemistry at the University of New South Wales in 1983. Since 2000 he has been associate dean (Research) in the Faculty of Science.

He has spent study leave at the ETH Zürich, Würzburg University, and Cambridge University, and held Visiting Professorships in Tokyo, Auckland, Göttingen, Innsbruck, and Kobe, and given invited lectures at international conferences and major universities.

IUPAC Involvement

Professor Black has been a member of the Organic and Biomolecular Chemistry Division of IUPAC since 1994. He has been division secretary (2000–2001) and is currently vice president. He has served as a

IUPAC Elections

member and secretary of the Biomolecular Subcommittee (1995–2000). He is also chair of the Subcommittee on Organic Synthesis (1997–present) and member of the Inter-Divisional Subcommittee on Green Chemistry (2001–present).

Recently he was also a member of the Editorial Board of *Pure and Applied Chemistry* (1997–2001) and a member of the ad hoc working party on the Strategic Plan Upgrade. From 1999–2002, Black was the chair of the Australian National Committee for Chemistry, with responsibility for relationships with IUPAC. In this context he was involved in the planning and execution of the IUPAC Congress and General Assembly in Brisbane in 2001.

Related Professional Activities

He has been a member of the Editorial Board of *Advances in Heterocyclic Chemistry*, and the executive of the International Society for Heterocyclic Chemistry, serving a term as past president. He is currently editor of Volume 15 of *Science of Synthesis*, being published by Thieme.

Awards

Prof. Black has won the Royal Australian Chemical Institute Rennie and H. G. Smith medals, and was national president in 1998.

John Corish (Ireland)



Prof. Corish's research interests are in matter transport in solids, including transdermal drug delivery. He has published more than 150 papers and several patents that resulted in a commercial product sold in 22 countries.

Education and Career

Prof. Corish obtained his B.S. and Ph.D. Degrees at University College Dublin before moving to the University of Western Ontario as a postdoctoral fellow and lecturer. He returned to University College as a college lecturer before being appointed in 1982 to the chair of Physical Chemistry at Trinity College, University of Dublin. He was elected a fellow of the College in 1986.

He is currently head of the Department of Chemistry at Trinity, a post he previously held from 1985 to 1991. In Trinity he has also served as dean of the Faculty of

Science, bursar (vice president finance), and as its first dean of research (vice president research). In the latter post he was responsible for the university's interaction with industry and for its very successful campus company program. He served on the Board of the College for 10 years and has extensive experience in project management having chaired a number of committees including the Business and Industry Committee, the High Performance Computing Development Committee, the Research Committee, and the building committees for two major buildings.

Related Professional Activities

Outside the college, Corish has been a member of the Council of the Institute of Chemistry of Ireland. He was president of the Institute from 1990–92. He has served on the Trades Council and Innovation and Technology Policy Committee of the Irish Business and Employers Confederation, as chair of the Chemical and Allied Products Industrial Training Committee of the Irish Industrial Training Authority, and as a member of the Royal Dublin Society's Science Committee. He was elected a member of the Royal Irish Academy in 1986, was a member of its Council from 1998–2002, and was Academy vice president in 2000.

IUPAC Involvement

Corish's service in IUPAC started in 1979. On the Commission on High Temperature and Solid State Chemistry, he has served as secretary (1987–91) and chairman (1991–95). He served as vice president (1995–97) and president (1997–2001) of the Inorganic Chemistry Division. From 1987–93 he was a member of the Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS) and from 1999–2001 he was a member of the Evaluation Committee. He is currently acting secretary of the Inorganic Division, chairman of the Subcommittee on Materials Chemistry, and a member of ICTNS.

Since 1999 he has been responsible for the IUPAC process for the naming of new elements. He has also served on the Bureau and has been a member of the Irish delegation to several Councils.

Treasurer

Dr. Christoph F. Buxtorf (Switzerland), the present treasurer, was elected to a four-year term in 1999. He is eligible for re-election for a second four-year term. As of 1 May 2003, there were no other nominations for treasurer.

IUPAC Elections

Christoph F. Buxtorf (Switzerland)



In 2000, after 34 years with Sandoz and Novartis, Dr. Buxtorf retired as head of Manufacturing and Technology at Novartis Crop Protection, now Syngenta. In his career, he had technical and managerial responsibilities in manufacturing and chemical development in Switzerland and the USA. Dr. Buxtorf was a member of Boards in Europe and the Far East on behalf of Novartis. He was a member of the Executive Committee of Novartis Crop Protection, which was responsible for worldwide operations in manufacturing and technical development. He was also a member of the Technology Advisory Board and the Safety and the Environmental Council of Novartis. Buxtorf was further trained in finance management and corporate strategy in Europe and at Harvard University.

Education

Dr. Buxtorf received a degree in chemistry from the Engineering School in Burgdorf, a Dr. of Science from the University of Fribourg, Switzerland, followed by a post doctoral fellowship with the National Council of Canada at the McGill University, Montreal.

IUPAC Involvement

Since 1999 Buxtorf has been Treasurer and a member of the Executive Committee and the Finance Committee. He chaired the working party on National Subscriptions and Related Finance Matters and was a member of the Conference Policy Development Committee and the ad hoc working group on industrial relations.

Related Professional Activities

Dr. Buxtorf is a member of the Society of the Swiss Chemical Industry and the Swiss Chemical Society in which he was active in the division of Chemical Industry for 12 years. As chairman of the manufacturing section of the European Crop Protection Industry, he had extensive responsibility for worldwide industry standards.

Bureau

Elected Members of Bureau, retiring in 2003, who are not eligible for reelection, but who may be nominated for another office:

- Prof. Hitoshi Ohtaki (Japan)
- Prof. Gerhard M. Schneider (Germany)

Elected Members of Bureau, retiring in 2003, who are eligible for reelection for a further four-year period:

- Prof. Nicole J. Moreau (France)
- Prof. Oleg M. Nefedov (Russia)

Elected Members of Bureau who were elected at the 41st Council until 2005:

- Prof. Chunli Bai (China)
- Prof. S. Chandrasekaran (India)
- Prof. Robert G. Gilbert (Australia)
- Dr. Edwin P. Przybylowicz (USA)
- Dr. Alan Smith (UK)
- Prof. Gus Somsen (Netherlands)

Nominations for Bureau received as of 1 May 2003 (the statutory deadline of 15 June 2003), are as follows:

- Prof. Bryan Henry (Canada)
- Prof. Anders Kallner (Sweden)
- Prof. Dr. Werner Klein (Germany)
- Prof. Nicole Moreau (France)—reappointment
- Prof. Oleg Nefedov (Russia)—reappointment

Bryan Henry (Canada)

See profile above as nominee for vice president.

Anders Kallner (Sweden)



Kallner's main research areas have been lipid and vitamin metabolism, nutrition, clinical conditions related to various markers, statistics and modelling, and the chemistry of natural products, particularly innate antibiotics. He has been active in various aspects

of quality improvement in the laboratory and promoted accreditation of medical laboratories. He has contributed to several Standards from ISO (TC 212, and CASCO 10) and CEN (TC140) and been a consultant to the World Health Organization in Alexandria and Geneva. In addition, he has been project leader for several projects on quality management in hospital laboratories in the Baltic countries and Russia and is presently project leader for a major project in N.W. Russia (Murmansk and St. Petersburg).

Education and Career

Anders Kallner studied general chemistry at the University of Stockholm and organic chemistry at the

IUPAC Elections

Royal Institute of Technology in Stockholm before graduating in biochemistry (Ph.D.) from the Karolinska Institute in 1967. He later earned his M.D. at the same university and later became associate professor of Clinical Chemistry at the Karolinska Institute. He has held positions in county, regional, and university hospitals and is presently senior consultant at the Department of Clinical Chemistry at Karolinska University Hospital in Stockholm, Sweden.

IUPAC Involvement

Kallner is presently president of the Chemistry and Human Health Division. He has been involved since 1991 when he became a member of the Clinical Chemistry Section of the Division. In 1999, he coordinated a project to establish strategies to set global quality specifications in laboratory medicine, and he is now a member on a task group whose goal is to compile a compendium for chemists of terms applied to drug development.

Related Professional Activities

Kallner has been active in the Executive Board of the International Federation of Clinical Chemistry and Laboratory Medicine as secretary, treasurer, and vice president. He is currently chairman of the Swedish Committee for Standardisation in Laboratory Medicine. He is also a member of the Swedish Society for Clinical Chemistry and the American Association of Clinical Chemistry.

Kallner has published more than 150 scientific papers in international journals, authored educational material for medical students, and made over 200 oral presentations and posters at national and international congresses and conferences.

Werner Klein (Germany)

Profile submitted after press deadline—see Web site for details.

Nicole J. Moreau (France)



Prof. Moreau successfully designed the first purification, using affinity chromatography, of enzymes that inactivate aminoglycoside antibiotics. Her research is at the interface of chemistry and life sciences, and she continues to

study the mode of action of antibiotics and the way bacteria can resist them.

Education and Career

Prof. Moreau received an M.S. in physical chemistry from the University of Paris (Sorbonne). She obtained a doctorate in physical sciences (chemistry distinction) in 1967 from Orsay University. In 1972, Moreau joined the chemistry laboratory of Prof. Le Goffic at Ecole Normale Supérieure in Paris, where she worked until 1993. In 1973, she was a postdoctoral fellow in the laboratory of Dr. J. S. Pitton at the Medical Microbiology Institute in Geneva, Switzerland. Prof. Moreau began service with the Centre National de la Recherche Scientifique (CNRS) in 1962, where she was directeur de recherche from 1979 to 1992. She has been a full professor at University Paris 6 (Pierre and Marie Curie) since 1993. She also has been a professor at the Laboratory of Molecular Research on Antibiotics of the University Paris 6 since 1994.

IUPAC Activities

Prof. Moreau served as vice president of the French National Committee for Chemistry (IUPAC NAO) since 1994 and as a member of the French National Committee of Chemistry Delegation at IUPAC since 1995.

Related Professional Activities

Moreau has held a number of leadership positions with leading chemistry institutions: Chargé de Mission, ministère de la recherche—Adjoint du chef du département “Médicaments” (1984–89); secretary (1989–97) and president (1997–99) of EUCHEM (European Chemistry); president of GESA (Study Group of Structure-Activity Relationships, 1990); Chargé de Mission, Department of Chemical Sciences—CNRS (1993–97); secretary of the Maison de la Chimie Foundation International Prize (1994–present); directeur Scientifique Adjoint, Department of Chemical Sciences—CNRS (1998–present). In addition, she is a long-time member of the French Chemical Society, French Microbiology Society, and the French Biochemistry and Molecular Biology Society.

Awards

Moreau was awarded the Prix de l'Académie de Pharmacie, Paris, in 1974, and the Chevalier de l'Ordre National du Mérite, awarded by the State Department of Research, in 2002.



Oleg Nefedov (Russia)

Prof. Nefedov is a well-known organic chemist with special interests in physical organic chemistry, small-ring chemistry, organic synthesis, and organometallic chemistry. He is one of the founders of the modern chemistry of carbenes and their Group 14 element analogs. His first review published in this area in *Angewandte Chemie* in 1966 actually initiated the development of this new field of organometallic chemistry. Another area of his research activities is related to the chemistry of diazocompounds, cyclopropanes, and cyclopropenes. Prof. Nefedov has also developed a new approach to the introduction of fluorine into aromatic rings.

Education and Career

Nefedov pursued his graduate studies at the Mendeleev Institute of Chemical Technology, Moscow. In 1967 he received a Doctor of Sciences (Organic Chemistry) from the N. D. Zelinsky Institute of Organic Chemistry, Moscow. From 1957 to 1968, he was a research scientist at the Zelinsky Institute of Organic Chemistry, Moscow. Between 1959 and 1960, he held a postdoctoral fellowship at Heidelberg University, Germany and from 1965 to 1966 he was a postdoctoral fellow at the Free University in Brussels, Belgium.

In 1968 he became professor of chemistry and head of the Laboratory of Carbene and Small-Ring Chemistry at the Zelinsky Institute. In 1987, Nefedov was made a full member of the USSR Academy of Sciences, subsequently the Russian Academy of Sciences. He later became vice president of the Academy and academician-secretary of its Division of General and Technical Chemistry. Since 1990, he has been chairman of the Russian Academy of Sciences Higher Chemical College, and since 1996 he has been

chairman of the National Committee of Russian Chemists. He has also been a visiting professor in the USA, Japan, France, and Germany.

IUPAC Offices and Assignments

Currently Prof. Nefedov is an elected member of the IUPAC Bureau (2000–2003) and its Executive Committee (2001–2003). He serves as a member of the Evaluation Committee for IUPAC projects as well. Since 1996 he has been the chairman of the National Committee of Russian Chemists for IUPAC. He was also a titular (1981–91) and associate (1991–93) member of the Commission on Physical Organic Chemistry. Since 1981 he has regularly participated in all IUPAC General Assemblies and in many IUPAC and other international conferences.

Related Professional Activities

Nefedov is editor-in-chief of a number of journals, namely, *Mendeleev Communications*, *Russian Chemical Bulletin (Izvestiya Akademii Nauk. Seriya Khimicheskaya)*, and the *Russian Chemical Reviews (Uspekhi khimii)*. He has authored numerous scientific papers and books on organic and physical chemistry, chemical aspects of ecology, and social problems of science.

Awards

Among the many honors that Nefedov has received are the USSR State Prize, Moscow, 1983 and 1990; Zelinsky Prize, Moscow, 1987; Prize of the USSR and Hungarian Academies of Sciences, Moscow, 1988; Semenov Prize, Moscow, 1991; Karpinsky Hamburg, 1993; and D. I. Mendeleev Gold Medal, Moscow, 1998; and the Russian State Prize in Science and Technology, 2002. 🌐



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

NMR Chemical Shifts: Updated Conventions

The recent IUPAC document on conventions for chemical shifts (*Pure and Applied Chemistry* **73**, 2001, 1795), which has been well received by the nuclear magnetic resonance (NMR) community, left a number of outstanding issues for later debate. These include (i) temperature variation of the signals for the standards, (ii) the use of magic-angle spinning for both solutions and solids, (iii) solvent effects, (iv) susceptibility measurements/corrections, and (v) conventions for shielding tensors. These matters will now be taken up by a Task Group including R. K. Harris (chairman), E. D. Becker, S. M. Cabral de Menezes, P. Granger, and K. W. Zilm. An evening "open forum" has been arranged during the 16th International NMR Meeting on NMR Spectroscopy at the University of Cambridge, 29 June to 3 July 2003, to discuss the relevant questions.

Anyone with views or information about these issues should contact either <r.k.harris@durham.ac.uk> or <tbecker@nih.gov>.

 www.iupac.org/projects/2003/2003-006-1-100.html

Terminology for Radical Polymerizations with Minimal Termination

About 10 years ago it was discovered that the addition of certain compounds—e.g., nitroxides or complexes of Cu(I)—had a profound effect on the course of a radical polymerization. The radicals formed are then able to persist for long periods, consequently the molecular weight of the polymer produced increases with conversion, resulting in low polydispersity. In their enthusiasm for novel reactions of this kind, the authors of papers describing their results developed individual types of nomenclature without any coordination.

The frenzy of activity on the part of individuals outside IUPAC to attempt to define terms, or to call for regulated terminology, demonstrates the urgent need for an appropriate IUPAC body to quickly provide an internationally agreed set of terms in this field of the so-called "living" and/or "controlled" radical polymerization. The IUPAC Subcommittee on Macromolecular Terminology wishes to resolve these issues with a minimum of delay.

For more information contact the Task Group Chairman Aubrey D. Jenkins at <adjjj@jjadjj.u-net.com>.

 www.iupac.org/projects/2002/2002-006-2-400.html

Toward a Core Organic Chemistry Curriculum for Latin American Universities

The Committee on Chemistry Education (CCE) and the Organic and Biomolecular Chemistry Division have jointly endorsed a project with the following objectives:

- to propose general recommendations for up-to-date university curricula in organic chemistry without interfering with instructors' freedom
- to contribute to the public understanding of chemistry by introducing fundamental concepts that demonstrate how organic chemistry is important to most aspects of common life
- to facilitate communication, transferability of courses, and exchange of students, as well as insertion of graduates into transnational industries

CCE proposes that this be a pilot project focused on Latin America. The goal is not to unify curricula worldwide, but instead to concentrate on a region where there is a demonstrable interest. If successful, the project might be extended to other developing countries and/or regions.

The Task Group proposes to develop recommendations for curricula in organic chemistry, including a set of required and recommended topics to be covered at each educational level in a university. One goal is to ensure that students reach an acceptable level of knowledge by the end of their course of studies, without undue gaps. There is no intention of imposing a uniform curriculum; the aim is to define what new material should be introduced and what can be deleted or reduced. A similar project was recently undertaken in Europe, in which more than 200 universities have been developing the European Chemistry Thematic Network <www.cpe.fr/ectn>.

The initial Task Group, which included members from Argentina, Chile, Brazil, Mexico, and Europe, have exchanged information and classified topics as essential, desirable, or non-essential. Since the project began in the summer of 2002, the Task Group has made good progress, in part because it has grown to include new members. An informal meeting was first held in August 2002 in conjunction with the 16th IUPAC Conference on Physical Organic Chemistry (ICPOC16), San Diego, California, USA. The participation of other conference attendees resulted in very stimulating discussions and suggestions and valuable input from a number of organic chemists. The project was later presented as a

The Project Place

plenary lecture at the XXV Latin-American Congress of Chemistry in September 2002, where it resulted in a full and wide-ranging discussion.

The Task Group has now identified a number of key issues, including the range of backgrounds of students entering the course, the stimulation of interest, emphasis on social responsibility, the introduction of material in a regional context, the provision of courses for non-majors and students of the humanities, transferability between courses, and the dissemination of the final recommendations and conclusions. Future discussions will include the identification of essential topics and the number and type of courses. These issues will be explored over the following months and reported on later.

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



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

Rules for Stating When a Limiting Value is Exceeded

This is a brief summary of an IUPAC activity carried out under the Chemistry and Human Health Division. The former Commission of Toxicology (COMTOX) has established a set of rules for stating whether or not a measurement result is in conformity with given specifications.

Conformity testing is a systematic examination of the extent to which a measurement result indicates that the value of the measurand (e.g., the concentration of a substance in a matrix) conforms or not with a given limiting value. This procedure has some very well-known and practical applications, such as detecting doping in sports, alcohol levels in drivers' blood, levels of toxic metals in workers' blood, the proportion of gold in alloys, and the amount of pesticides in drinking water. The objective of the rules for stating when a limiting value is exceeded is to provide assurance of conformity, either in the form of a supplier's declaration, or of a third-party certification. A specification is usually formulated as a single limiting value or upper and lower limiting values. The assurance may be in the form of a supplier's declaration or of a third-party certification.

When conformity testing involves measurement or sampling uncertainty, it is common practice to use elements from the theory of statistical hypothesis testing to provide a formal procedure. If you know the meas-

urement procedure and if you can determine a level of uncertainty for that measurement, you can also estimate and minimize the risk of making errors in claims of conformity or non-conformity to the particular specifications. The description of the rules was published by Christensen et al. (Christensen JM, Holst E, Olsen E, Wilrich PT. Rules for stating when a limiting value is exceeded. *Accred. Qual. Assur.* 7, 28-35 [2002]).

Test for Conformity Versus Test for Non-Conformity

Different tests exist for conformity and non-conformity. Which one you use depends on the consequences of a wrong statement. An example of a test for conformity is an investigation of the amount of pesticide in a drinking water supply system that serves several hundred thousand people. A declaration that the concentration of the pesticide is below the limiting value—i.e., the point at which that water supply is deemed unsafe—should be made with great confidence. On the other hand, a test for non-conformity might involve measuring the alcohol concentration in a driver's blood. A declaration that the blood-alcohol concentration in a particular driver exceeds the limiting value—i.e., that person is driving while drunk—should also be made with great confidence.

A test for conformity must always result in only one of the following statements:

- **Statement A:** The measurement results have demonstrated beyond any reasonable doubt that the value of the measurand is in conformity with the requirement.
- **Statement B:** The measurement results have demonstrated beyond any reasonable doubt that the value of the measurand is not in conformity with the requirement.
- **Statement C:** The measurement results have not been able to demonstrate beyond any reasonable doubt whether the value of the measurand is or is not in conformity with the requirements.

The rules for testing conformity are as follows:

Rule 1: For a one-stage testing procedure, conformity with the requirements is declared, if and only if, the uncertainty interval for the value of the measurand is inside the region of conformity.

Rule 2: For a two-stage testing procedure, conformity with the requirements is declared, if and only if, the uncertainty interval for the value of the measurand is inside the region of conformity either after the first stage or after the second stage. The second stage of the test is performed if, and only if,

The Project Place

the uncertainty interval calculated after the first stage includes a specification limit.

The power function of the conformity test can be calculated when the uncertainty is known. The power function of the test is the probability of declaring conformity and it is a function of the measurand value. For both the one-stage and the two-stage procedures, formulas for the calculation of the power function and the probability of obtaining an inconclusive result are available at <www.ami.dk/research/conformity>. At the same Web site a freeware computer program, conform1e.exe, is available for the calculations of the probabilities for statement A, B, or C.

The rules described above may assist organizations in making proposals for legislation concerning limiting values. Such organizations may be government agencies, laboratories, or others who are responsible for checking conformity to limiting values by interpreting measurements and taking into account the uncertainty of the results.

For more information, contact the Task Group Chairman Jytte Molin Christensen at <Q-International@wanadoo.fr>.

 www.iupac.org/projects/1993/720_4_93.html

Provisional Recommendations

IUPAC Seeks Your Comments

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

Glossary for Toxicokinetics of Chemicals

This glossary contains definitions of 355 terms frequently used in the multidisciplinary field of toxicokinetics. The glossary is compiled primarily for chemists who currently work in toxicology and require knowledge of the expressions used in toxicokinetics, especially in relation to hazard and risk assessment. Medical terms are included because of their frequent occurrence in the toxicological literature and because chemists would not normally be expected to be familiar with them. There are three annexes, one containing a list of abbreviations used in toxicokinetics, one containing a list of abbreviations of international bodies and legislation that are relevant to toxicology and chemical safety, and one giving sources of interest for further reading.

Comments by 30 September 2003 to:

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 www.iupac.org/reports/provisional/abstract03/nordberg_300903.html

Definitions of Terms Relating to Reactions of Polymers and to Functional Polymeric Materials

This document defines the terms most commonly encountered in the field of polymer reactions and functional polymers. The scope has been limited to terms that are specific to polymer systems. The document is organized into three sections. The first defines the terms relating to reactions involving and specific to polymers. Names of individual chemical reactions are omitted from the document, even in cases where the reactions are important in the field of polymer reactions. The second section defines the terms relating to polymer reactants and reactive polymeric materials. The third section defines terms describing functional polymeric materials.

Comments by 31 July 2003 to:

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 www.iupac.org/reports/provisional/abstract03/horie_310703.html

Critical Evaluation of Stability Constants for α -Hydroxycarboxylic Acid Complexes with Protons and Metal Ions and the Accompanying Enthalpy Changes Part II: Aliphatic α -Hydroxycarboxylic Acids (IUPAC Technical Report)

by R. Portanova, L. Lajunen, M. Tolazzi, and J. Piispanen

Pure and Applied Chemistry,
Vol. 75, No. 4, pp. 495–540 (2003)

The hydroxycarboxylic acids and their derivatives are important chemicals for the pharmaceutical, biological, food, and other industries. Various hydroxycarboxylic acids occur naturally. The technological, practical, and industrial applications of these compounds have led to numerous studies of their properties and characteristics.

The hydroxycarboxylic acids contain two donor groups, the hydroxyl and the carboxylate groups, and therefore are all potentially bidentate ligands. The proton and metal ion complexation constants of these ligands depend strongly on the relative positions of the two donor groups in the molecule. The α -hydroxycarboxylic acids form considerably stronger complexes with most metal ions, through bidentate chelation involving both functional groups, than do the corresponding simple carboxylic acids. Hydroxyl groups more distant from the carboxylic groups do not generally participate in the formation of chelate complexes, and the ligand coordination to metal ions occurs via the carboxyl group only.

The hydroxycarboxylic acids form stable complexes with most metal ions. Owing to the considerable amount of reported data, in the form of protonation and metal ion binding constants, the critical evaluation of the equilibrium data in this paper is restricted to proton and metal ion complexation with aliphatic monoprotic α -hydroxycarboxylic acids, in aqueous solution, published between 1960 and 1994. Little relevant data that was published earlier are included in this paper. Enthalpy changes, when available, are also reported. Equilibrium data obtained in non-aqueous or in solvent mixtures, as well as those dealing with the formation of mixed complexes, are not surveyed in this paper.

Many determinations of acid dissociation constants and metal ion complexation constants with hydroxycarboxylic acids have been reported. Various experi-

mental methods have been used for the measurements, mainly potentiometry, spectroscopy, and distribution between two phases. Several studies were carried out in media of constant ionic strength (commonly in the range 0.1 - 2.0 mol dm⁻³), the supporting electrolytes being sodium perchlorate, but also sodium chloride, potassium chloride, and nitrate. The majority of the measurements were performed at 25 °C.

 www.iupac.org/publications/pac/2003/7504/7504x0495.html

Endocrine Disruptors in the Environment (IUPAC Technical Report)

by J. Lintelmann, A. Katayama, N. Kurihara, L. Shore, and A. Wenzel

Pure and Applied Chemistry,
Vol. 75, No. 5, pp. 631–681 (2003)

Many chemical substances of natural or anthropogenic origin are suspected or known to be endocrine disruptors, which can influence the endocrine system of life. This observation has led to an increased interest on the part of the public and the media, as well as to a steep rise in research activities within the scientific community. New papers and results are presented so quickly that it is impossible to give a complete review of this emerging research field. Therefore, this paper tries to provide insight into several topics that encompass the great scope of endocrine disruptors in the environment.

The paper explains some parts of the endocrine systems of mammals and non-mammals in order to provide general biochemical and biological background information. Important mechanisms of endocrine disruption, such as interactions with hormone receptors, are described. Strategies for testing anthropogenic chemicals on various organisms are critically reviewed with respect to their problems and gaps. The main emphasis of the paper involves chemical substances that are suspected or known to be endocrine disruptors. Physicochemical data, such as water solubility, as well as information about their use and/or function, are reviewed and compared to provide a clearer picture of their behavior in the environment. The paper also describes the main routes of exposure for most chemicals and provides data related to concentrations in the environment (soil/sediment, water).

 www.iupac.org/publications/pac/2003/7505/7505x0631.html

Measurement of pH: Definition, Standards, and Procedures. (IUPAC Recommendations 2002)

Pure and Applied Chemistry,
Vol. 74, No. 11, pp. 2169–2200 (2002)

reviewed by Friedrich G. K. Baucke

IUPAC Recommendations 2002 replace Recommendations 1985 (*Pure and Applied Chemistry* 57[1985], 531–542), which are metrologically unsatisfactory and had been especially criticized for recommending two pH scales to measure two different pH values of any analyzed solution. This shortcoming had been realized by the experts, who, however, could not agree on one of the scales and recommended that the 1985 document be replaced by an amended document when “a thermodynamically and metrologically sound pH scale can be recommended.” An overview of this issue can be found in *Analytical and Bioanalytical Chemistry* 374(2002),772–777.

A new amended document, Recommendations 2002, strictly follows metrological principles. pH is defined (notionally) according to Sørensen and Linderstrøm-Lang (1924)

$$\text{pH} = -\lg a_{\text{H}} = -\lg (m_{\text{H}^+}/m^\circ)$$

(a = relative activity, m = molality, γ = molal activity coefficient, and m° = standard molality = 1 mol kg⁻¹), to which all assigned and measured pH values are traced back within stated uncertainties, thus securing an unbroken chain of comparison.

Because pH involves a single ion quantity, the hydrogen ion activity, it is immeasurable. It is therefore experimentally verified, with stated uncertainties, by primary standard pH(PS) values of primary standard buffer solutions (PS). The assignment is carried out in a cell without transference involving a Pt|H₂ electrode, the so-called Harned cell, which already has been extensively applied by Bates. It is defined a primary method of measurement and involves the Bates-Guggenheim convention. The new document states for the first time an estimated uncertainty of the Bates-Guggenheim convention, whose introduction into the conventional pH(PS) makes the incorporation of pH(PS) into the internationally accepted SI system of measurement possible. Seven buffer solutions qualifying as primary buffers are recommended. Their actual pH(PS) are to be certified by national metrological institutes (NMIs) and to be stated, together with their uncertainties, in certificates, which are to accompany the respective lots of the certified buffer materials. These pH(PS) values are to be used in prac-

tice, whereas pH(PS) values listed in a table of the document merely serve as examples. PS buffers are mainly applied by accredited laboratories for assigning secondary pH(SS) values to secondary standard buffers (SS).

For practical pH measurements, the application of SS buffers is more convenient. They do not meet the stringent requirements of PS or, if they do, are not assigned pH(PS) in a Harned cell for economic reasons. Since pH(SS) values are determined by comparison with pH(PS) values of primary buffers in cells with liquid junction (except for one case), their uncertainties are slightly larger, which is the reason for their status as secondary standards. Three cells are recommended for the assignment, and for each the typical uncertainty is given. The work is to be carried out by NMIs or accredited laboratories, which are to issue certificates containing the actual pH(SS) values. These certificates will then accompany the respective lots of the certified materials. The document presents several examples. SS buffers are applied whenever practical pH cells are calibrated.

Practical pH measurements are conducted in cells with liquid junction employing a glass electrode. They either contain the separate glass and reference electrodes or consist of their combination in so-called combination or single rod electrodes. Because of systematic and random effects of glass electrodes and liquid junction potentials, practical cells must be calibrated. The document recommends three—the one-point, two-point, and five- or multi-point calibration procedures—each of which has a characteristic uncertainty. Because the appropriate calibration procedure applied depends not only on the required target uncertainty of the measurement, it is not always possible to give a general rule for its choice.

The new recommendations are legally applicable because they yield one pH value, within stated uncertainties, for every analyzed dilute solution within the temperature range 0 to 50 °C. This is a most significant property and a true improvement over the 1985 document, which allowed the measurement of at least eight distinct, although not very different, pH values for each solution. Besides, pH is now part of the SI system of measurement, although this may be needed infrequently. The work of the Working Party on pH, which established the document through four years of dedicated work, was thus not only necessary, but also successful.



www.iupac.org/publications/pac/2002/7411/7411x2169.html

Bookworm

Natural Products

A special topic issue of *Pure and Applied Chemistry*, Vol. 75, Nos 2–3, 2003

The riches of nature continue to offer inspiration and, increasingly, new challenges and opportunities for discovery and exploitation.

The traditional centrality of natural products in organic chemistry is reflected in an unbroken series of biennial IUPAC symposia reaching back to 1960. The riches of nature continue to offer inspiration and, increasingly, new challenges and opportunities for discovery and exploitation. This evolving process was reflected in the scientific program of the 23rd International Symposium on the Chemistry of Natural Products, held in Florence, Italy, from 28 July to 2 August 2002, which presented works devoted to a broad cross-section of traditional subdisciplines, while also featuring a range of topics such as proteomics, genetics, and molecular biology.

Overall, the symposium was an enriching experience for all those who attended, and undoubtedly a source of inspiration to a large contingent of young scientists from many countries. It is, therefore, desirable to share the topicality and relevance of the event with a wider audience, and this special topic issue of *Pure and Applied Chemistry* offers a representative selection of short reviews and research papers based on the scientific proceedings. It is hoped that it will serve, not only as an enduring record of the current state of natural products research, but also as a signpost pointing to future challenges and opportunities. This issue is part of an ongoing project, which seeks to recognize and offer more in-depth coverage of certain IUPAC-sponsored events featuring new and emerging themes in all branches of chemical sciences. The issue was coordinated by Professors J. Bull and Bruno Botta, chairman of the Conference Organizing Committee.

The symposium attracted about 500 delegates from 45 countries, and the success of the event owes much to an outstanding corps of international scientists who contributed to a program comprising 13 plenary and 16 invited lectures, supported by 57 oral presentations and no less than 250 posters. The lecture program offered diverse coverage of structures

and function in life processes, as well as novel approaches for synthesis of complex bioactive compounds. The unifying theme of the conference was interdisciplinary foundations of drug design and synthesis. This theme is encapsulated in the opening plenary lecture that introduces this issue, with an account of new therapeutic leads inspired by nature, and a concluding plenary presentation highlighting the design and execution of classical and new-generation synthetic strategies in pursuit of natural and unnatural targets. Biomimetic and chemoenzymatic approaches recur throughout as a complementary component of modern synthetic methodology, and exemplify the rapidly expanding boundaries of the chemistry-biology interface. New insights into biosynthetic pathways and advances in functional genomics and proteomics research featured prominently in the symposium program. They are reflected in some of the presentations in this collection.

Professor Paul Wender of Stanford University, California, gave the introductory plenary lecture and presented a brilliant overview of his recent research (*Inspirations from Nature: New Reactions, New Therapeutic Leads, and New Drug Delivery Systems*). The following plenary lecture was presented by Professor Gerhard Höfle, Braunschweig, Germany, and provided new molecular insight into the important tubulin systems (Semisynthesis of the Tubuline Inhibitors Epothiolone and Tubulysin). Professor Gerald Pattenden presented his successful research on cascade radical processes and Pd-catalysed reactions in natural product synthesis (*Synthetic Studies towards Biologically Important Natural Products*).

Professor Chi-Huey Wong of the Scripps Research Institute, LaJolla, CA, USA, presented some of his exciting work on the chemoenzymatic synthe-



sis of oligosaccharides and glycoproteins and on the design and synthesis of inhibitors targeting carbohydrate enzymes and specific RNA sequences associated with bacterial infection, inflammatory reactions, and cancer metastasis. Professor Michel Rohmer of the Université Louis Pasteur/CNRS, Strasbourg, France, presented an overview of his discovery of the mevalonate independent pathway for isoprenoid biosynthesis.

Professor Raffaele Riccio of the University of Salerno, Fisciano, Italy, presented the use of advanced NMR spectroscopy and computational techniques for structural assignments of complex natural products. Professor Benito Casu of the Ronzoni Institute for Chemical and Biochemical Research, Milano, Italy, discussed recent results on antiangiogenic, heparin-derived heparan sulphate mimics. The final plenary lecture was presented by Professor Stephen

Hanessian of the Université de Montréal, Canada. In an elegant exposé he elaborated on new and old challenges in total synthesis from concepts to practice.

The symposium program reflected the trend that chemistry and biology fully overlap on a molecular level and that the chemistry of natural products will continue to be the core topic for our understanding of life processes and for efforts to utilize the new scientific knowledge for sustainable development. These studies will provide a deeper understanding of the chemistry of life processes and of complex biological and ecological interactions in nature. The scientific challenges as well as the possibilities for sustainable utilization of our natural resources are enormous—we can learn a lot from Mother Nature.



www.iupac.org/publications/pac/2003/7502

Molecular Order and Mobility in Polymer Systems

T. M. Birshtein (symposium ed.)

Macromolecular Symposia, Vol 191.

Wiley-VCH, 2003, pp. 1–200

(ISBN 3-527-30695-1)

This issue of *Macromolecular Symposia* features papers by invited speakers to the International Symposium on Molecular Order and Mobility in Polymer Systems, which was the fourth in a series of IUPAC-sponsored meetings on macromolecules held in St. Petersburg, Russia. The focus of the symposium was on problems of the equilibrium state in polymer systems. Unfortunately, not all of the speakers could present their work since some material had been published or submitted elsewhere. Nevertheless, this issue provides a more or less complete picture of the symposium.

The event was organized by the institute of Macromolecular Compounds of the Russian Academy of Scientists (RAS). The co-organizers of the symposium were the Department of Chemistry and Material Science of RAS and the Scientific Polymer Council of RAS. The symposium was sponsored by IUPAC and supported by the Russian Foundation for Basic Research and the St. Petersburg Research Center of RAS.

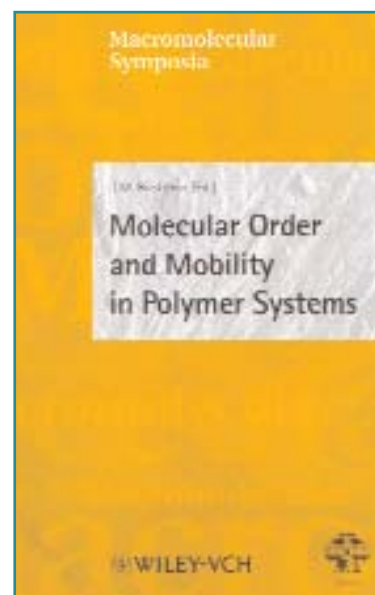
The symposium featured 33 invited lectures, 33 oral communications, and 260 poster presentations. Invited

lectures were given by well-known, active researchers, including Nobel Prize Winner P.-G. de Gennes; academicians of RAS; major scientists from Germany, France, Japan, USA, Canada, Netherlands, Spain, Greece, Sweden, Finland, and Russia. The papers represented in this issue are divided into seven thematic groups. Some work could be placed into several groups, and is so indicated. It is worth mentioning that some of the publications differ from the presenta-

tations made by their authors at the symposium, reflecting the results of the symposium itself.

Following is a sampling of the many papers to be found in this issue:

- P. G. de Gennes, Weak Segregation in Molten Statistical Copolymers
- A. Darinskii, Computer Simulation of the Liquid Crystal Formation in a Semi-Flexible Polymer System
- A. Blumen, Network Models and Their Dynamics: Probes of Topological Structure



Bookworm

- M. Cohen-Stuart, When Tethered Chains Meet Free Ones: the Stability of Polymer Wetting Films on Polymer Brushes
- J. François, Effects of Temperature on Neutron Scattering from Aqueous Solutions of Hydrophobically Modified Poly(ethylene oxide)

The contents of this issue reflect researchers' progress toward more complicated systems with the elements of nanostructure organization. This trend will be more pronounced at the 5th St. Petersburg Symposium, which is planned to take place in 2005.

 www.iupac.org/publications/macro/2003/191_preface.html

New Polymeric Materials

R. D. Sanderson and H. Pasch (symposium eds.)
Macromolecular Symposia, Vol 193.
Wiley-VCH, 2003, pp. 1–304
(ISBN 3-527-30697-8)

The UNESCO Chemistry for Life Division in Paris has 13 Associated Centres for research in chemical science and education. One of these is the UNESCO Associated Centre for Macromolecules & Materials, which is part of the Chemistry Department of the University of Stellenbosch, South Africa.

As part of its activities, UNESCO encourages and sponsors UNESCO Schools and scientific conferences in collaboration with scientific associations such as IUPAC. The UNESCO School and Conference on Macromolecules & Materials Science is held annually

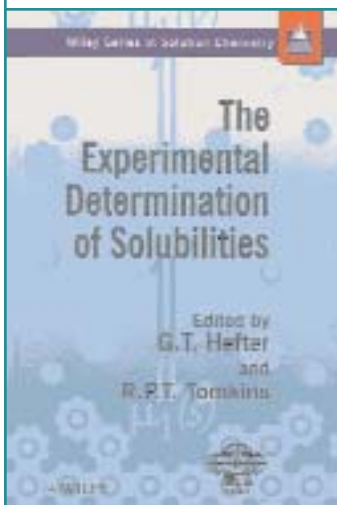
in Stellenbosch, South Africa. Leading scientists in various fields of macromolecular science are invited to give tutorials at the UNESCO School and informative plenaries at the conference.

The 5th UNESCO School & IUPAC Conference focused on new polymeric materials, polymer characterization, and recent developments in polyolefins. Abridged versions of a number of papers from the conference have been compiled in this volume of *Macromolecular Symposia*. The content of the papers is also available in the Virtual Teaching Encyclopaedia, which contains papers from previous UNESCO conferences as well, at <www.sun.ac.za/unesco/unesco.htm>.

 www.iupac.org/publications/macro/2003/193_preface.html

The Experimental Determination of Solubilities

Glenn T. Hefter and Reginald P. T. Tomkins (editors)
John Wiley & Sons, 2003
(ISBN 0-471-49708-8)



This book covers the most useful experimental methods for all types of solubility measurements. The importance of solubility phenomena has been long recognized throughout science. For example, in medicine, the solubility of gases in liquids forms the basis of life itself; in the environment, solubility phenomena influence the weathering of rocks, the creation of soils, the composition of natural water bodies, and the behavior and fate of

many chemicals. However, until now, no systematic critical presentation of the methods for obtaining solubilities has been given.

The book is divided into five sections: the first addresses the fundamental thermodynamic and kinetic background necessary for a full understanding of solubility phenomena. The next three sections cover the major types of solubility determinations according to the physical state of the solute: gases, liquids, and solids. The final section deals with those technologically important areas whose traditions are sufficiently different to justify their separate presentation.

Each chapter aims to be comprehensive but not encyclopedic, with coverage of the reliable methods in the particular area. Illustrations have been included to enable the novice investigator to quickly develop apparatus of their own. Where appropriate, contributors have included sets of data to enable workers to properly assess the quality of their apparatus, technique, and data.

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

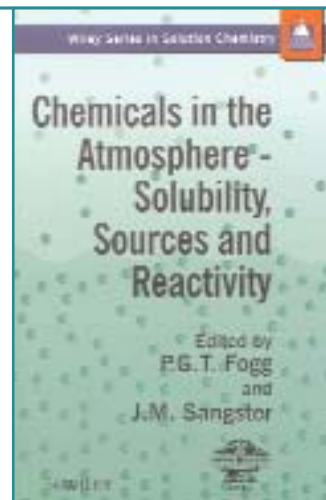
Bookworm

Chemicals in the Atmosphere: Solubility, Sources and Reactivity

Peter Fogg and James Sangster (editors)
John Wiley & Sons, 2003
(ISBN 0-471-98651-8)

This book—the outcome of a project of the Commission on Solubility Data—follows discussions between members of this commission and the Commission on Atmospheric Chemistry extending over several years. The book provides a broad survey and theoretical basis of many aspects of the behavior of stable and unstable chemicals in the atmosphere. There is special emphasis on heterogeneous processes at all levels of the atmosphere. Modern techniques of investigation and of modeling such processes are discussed and many experimental data relating to inter-

action of gases with cloud droplets and with surfaces of solid particles are included. There is a detailed account of theoretical and practical aspects of Henry's law constants, including their relationship to infinite dilution activity coefficients. Experimental values have been compiled and evaluated for dissolution in pure water and in some cases sea water of 15 inorganic and 153 organic stable compounds.



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

Photochemical Purification of Water and Air

Advanced Oxidation Processes: Principles, Reaction Mechanisms, Reactor Concepts
Thomas Oppenländer
Wiley-VCH, Weinheim, 2002
(ISBN 3-527-30563-7)

While the treatment of water and exhaust gas using ultraviolet light offers both ecological and economic advantages, information on photo-initiated advanced oxidation technologies (AOTs) has been dispersed among various journals and proceedings until now. This authoritative and comprehensive handbook is the first to cover both the photochemical fundamentals and practical applications, including a description of advanced oxidation processes (AOPs) and process engineering of suitable photoreactors. The author presents various real-world examples, including eco-

nomic aspects and uses the IUPAC recommendations for nomenclature in photochemistry. The book's many references to current scientific literature will facilitate research involving water and air industries. Throughout, over 140 detailed figures illustrate photochemical and photophysical phenomena.

Following is an excerpt from the foreword by James R. Bolton (president of Bolton Photosciences, Inc. and executive director of the International Ultraviolet Association): "Professor Oppenländer is well qualified to write about the AOPs/AOTs since he has contributed to this literature in a very significant manner. This book will be of considerable value to graduate students, science and engineering faculty, scientists, process engineers and sales engineers in industry, government regulators, and health professionals."

 www.wiley-vch.de

Conference Call

Safety in Chemical Production

by M. D. Booth

On 20 November 2002 a workshop entitled **Safety and Toxicology** was held at the premises of the SINOPEC Corporation in Beijing, China. The workshop, the fifth in a series organized by the IUPAC Committee on Chemistry and Industry (COCI), was cosponsored by UNESCO and SINOPEC.



Workshop Opening Session.

The workshop was chaired by Qi Zhai, the head of SINOPEC's Safety and Environment Bureau. Present were Yang Youming, deputy director of Work Safety Supervision, State Administration of Work Safety; and Axel Hebel, the UNESCO representative in Beijing. SINOPEC arranged for the workshop to coincide with a meeting of their safety and environment managers, which swelled the audience to over 150 delegates. Several members of the Chemical Industry and Engineering Society of China were in attendance.

Nelson Wright provided a brief introductory talk on IUPAC and COCI, concentrating on activities pertinent to industry. He was followed by Mike Booth who summarized the history of the safety workshops and provided an outline of the plan of implementation arising from the World Summit on Sustainable Development that had taken place in Johannesburg, South Africa, in August. Booth emphasized Section 22, which covers the management of chemicals throughout their life cycle. The full text of the plan of implementation can be found at <www.icca-at-wssd.org/Plan.pdf>.

Axel Hebel, program specialist for Science, Technology, and Environment of UNESCO in Beijing, provided a historical perspective on UNESCO's efforts

to assist developing countries and countries in transition with chemical safety programs. Hebel explained that UNESCO helps build up national and regional research and training capacities in the field of chemical safety through cooperation with competent international and regional networks and centers and national specialized scientific bodies and institutions. He intimated that the gap between developing countries and developed countries in the areas of safety education research and the implementation of safety measures has been widening. Therefore, he said, it has become vitally important to promote the communication and dissemination of state-of-the-art knowledge about safety and environmental protection in chemical production. Hebel also mentioned the Safety Training Programme—jointly developed by IUPAC, UNESCO, and the U.N. Industrial Development Organization—that promotes safety and environmental protection in chemical, pharmaceutical, and biotechnological research and production.

Steven Harper, who spent 11 years as a U.K. Government Chemical Inspector and who authored the *National Chemical Guidance*, summarized how the U.K. chemical industries have implemented the SEVESO II directive. He later discussed the classification and labelling of hazardous substances, with references to both U.K. and UN guidelines, and then outlined "emergency plans and preparedness."

Judy Castledine, director of Environment, Health, & Safety at Dow Chemical Pacific Limited (based in Hong Kong), talked about Dow's worldwide efforts on safety/environment/toxicology control and made particular reference to Dow's Asian plants and to the important role of Responsible Care, which makes every employee from the CEO down "responsible."

Harry C. Y. Heo, technical and safety manager, Asia Pacific Region, Nitriles, BP Chemicals (based in Seoul), outlined what BP does to improve awareness among customers and service providers about the safe handling of toxic materials such as acrylonitrile. He summarized BP's emergency response system and practices and emphasized the company's "Product Stewardship" program.

The workshop was organized by Jinliang Qiao, COCI representative from China and Mike Booth, COCI representative from South Africa.

Mike Booth <caiainfo@iafrica.com> is director of the Information Resources department of the Chemical and Allied Industries Association, in Auckland Park, South Africa, and is a member of the IUPAC Committee on Chemistry and Industry.

Physiological Reference Values: A Shared Business?

by Anders Kallner

The theme of the **Second European Symposium of the Clinical Laboratory and in vitro Diagnostic Industry**—held 6–7 February 2003 in Barcelona, Spain—was Physiological Reference Values: A Shared Business? The symposium, chaired by X. Fuentes-Arderiu, addressed several of the problems encountered in establishing, teaching, and using physiological reference values.

The format of the symposium was unique: questions were posed to a panel of experts who were then expected to address every question. The audience was also invited to participate in the discussion. The audience comprised scientists from Spain and Europe and representatives of the major manufacturers of reagents and instruments. The symposium was arranged by the Catalan Association for Clinical Laboratory Sciences and sponsored by IUPAC, IFCC, and major industries. Detailed proceedings of the symposium will be published by Hyltoft-Petersen.

Better understanding of reference intervals is vitally important because diagnosis of disease is frequently based on measurement of biochemical quantities (components) of blood, serum, urine, etc. Conclusions from obtained results are usually drawn by comparison with results obtained in healthy individuals or, less common, with individuals with specified diseases or conditions. The acceptance of a reference point or reference interval is as important for the physicians as a fixed point was for Archimedes: “Dòs mói pou̇ stō kai kinō tēn gen” (“give me a fixed point and I will move the earth”). Originally the profession used the term “normal value” but about 25 years ago it was agreed that normal was an improper term since it was very hard to find any “normal” individuals. The term was changed to “reference interval” or “reference value,” depending on its use. Also the concept was changed and broadened by introducing the concept of a “reference population” and even “reference individuals.” We can now refer a reference interval to a defined group of individuals who need not be healthy but may suffer from a specific condition. The concept also allows for relating the reference interval to age, gender, and ethnicity, as appropriate. The age and gender variation is known for many commonly used quantities.

All approaches to establishing reference intervals require large groups of individuals (e.g., a minimum of 120 individuals in the IFCC recommendation). It is an insurmountable task for any individual laboratory to establish its own reference values. Many published reference values are taken from textbooks and lack an acceptable “audit trail” to the original source. Thus, a reference interval is important for diagnosis and screening of populations, but as soon as the individual becomes a patient and undergoes treatment, the changes in the values of certain quantities might be more important than the absolute values. In these cases the patient becomes his or her own reference.

Considering the nature of the problem and the impact on health, diagnosis, and economics, it is important that reference intervals are scientifically based and appropriate for the actual situation of the patient and the physician. Up until quite recently establishment of reference intervals was very loosely regulated. However, the “EU IVD Directive 98/79 on *in vitro* diagnostic devices” can be interpreted as placing the responsibility for establishing reference intervals on the manufacturer of reagent kits and/or instruments:

“Where appropriate, the instructions for use must contain [...] the reference limits for the quantities being determined, including a description of the appropriate reference population: [].”

Nonetheless, the newly published international standard that is used for the accreditation of medical laboratories EN/ISO 151893 states,

“Biological reference intervals shall be periodically reviewed. If the laboratory has reason to believe that a particular interval is no longer appropriate for the reference population, then an investigation shall be undertaken, followed, if necessary, by corrective actions. A review of biological reference intervals shall also take place when the laboratory changes an examination procedure or pre-examination procedure, if appropriate.”

The USA has a similar set of rules, whereby manufacturers are obliged to provide reference intervals and the laboratories are obliged to prove that they are applicable in their environment.

The symposium made clear that although the EU IVD Directive 98/79 puts the responsibility on indus-

Conference Call

try to disseminate information about physiological reference intervals for their measurement systems, the industry is not well equipped or in a position to collect the necessary raw data without collaboration from the profession and medical laboratories. Panellists also argued that reference intervals need to be locally modified by the clinical laboratories. There are biological reasons for this, such as ethnicity or dietary habits, and also methodological reasons. Thus, there are many methods or method modifications available that do not give the same results although they set out to measure the same quantity (i.e., a deficient transferability of results between laboratories).

From a metrological point of view, transferability of results would be achieved if the same calibrator were used. Globally that requires that each calibrator is traceable to the same primary standard, preferentially the realization of the SI unit. In biological systems this hypothesis does not work very well. A major reason is the complex nature of the sample and the influence of the "matrix" defined as "all components of a material system, except the analyte." The matrix may not be consistent and may therefore have different influences on the results from patient to patient. For years the profession has tried to cope with the situation by external quality assessment schemes (EQA, Europe) and proficiency testing (PT, USA). The effect has largely been to identify that there are different measurement procedures on the market and that their results differ. Most of these schemes use artificial samples based on bovine or equine serum that may introduce bias due to the changed matrix. Furthermore the EQA or PT schemes are primarily designed to monitor the trueness of results and measure the bias between laboratories and it serves this purpose from a general point of view (e.g., CLIA 88 in the USA). However, its usefulness for the individual laboratory is limited.

An alternate solution to approach the trueness, reduce the bias, and meet the transferability demand would be to establish a network of laboratory comparisons using patient material. A NCCLS recommendation describes how such comparisons can be made, and a simplified and practical, yet powerful procedure has been developed. A very extensive experiment to align results of laboratories and to create identical reference values in a region has been carried out in the Nordic countries. Other multicenter projects have

been carried out. During the symposium, it was emphasized that establishment or appropriate reviewing of reference intervals are very cumbersome and expensive tasks and much would be gained if the reference intervals could be established in a sustainable way. The costs for establishing reference intervals can be exceedingly high and it was argued that it could be an obligation of the health authorities to finance this procedure.

Conclusions from the Symposium

The rulings by the EU Directive 98/79/EC (Annex I 8.7) and the EN/ISO 15189 (5.5.5) on the responsibilities of industry and laboratories to create reference intervals are not clear and—as written—difficult to interpret and follow. Symposium attendees proposed that a request be sent to CEN TC 140 and ISO TC 212 to clarify the demands of the directive and the standard.

It was concluded that a document resolving this question should address at least the following items:

- selection of reference populations and definition of its size
- criteria for homogeneity/partitioning of the reference population
- definition of pre-analytical conditions
- definition of quantity
- selection of method of measurement including calibrators, reference materials, control procedures, and analytical quality specifications
- transferability and alignment of results
- sustainability of reference intervals
- calculation and presentation of reference intervals

In addition, it was concluded that collaboration should be established between professional organizations, industry, and health authorities to achieve common reference intervals for homogeneous groups, including multicenter reference intervals. Also, the concept and interpretation of reference intervals should be taught to pre- and post-graduate students of health sciences and physicians.

Anders Kallner <anders.kallner@ks.se> is from the Department of Clinical Chemistry of the Karolinska Hospital in Stockholm, Sweden. He is the current president of the IUPAC Division of Human and Human Health.

 www.iupac.org/publications/ci/2003/2504/cc2_060203.html

Where 2B&Y

Solution Chemistry

23–28 August 2003, Debrecen, Hungary

The IUPAC-sponsored **International Conference on Solution Chemistry (ICSC)** series is a central event for the international scientific community involved in the various aspects of solution chemistry; it attracts the attention of both experimentalists and theoreticians worldwide. The conference takes place every second year in different countries and on different continents. In recent years, it has been hosted at Vaals in the Netherlands, Fukuoka in Japan, and Vichy in France. The meeting provides an ideal atmosphere for successful encounters of leading researchers with younger scientists, and fruitful discussions of the state-of-the-art advances in this broad-ranging area.

The scientific sections of the 28th ICSC will encompass a wide variety of basic and applied topics in solution chemistry: thermodynamics, kinetics and structure;

polymers, colloids and interfaces; bioinorganic and pharmaceutical problems; supramolecular assemblies and nanostructures; solvents and solutions under extreme conditions; theoretical, analytical, and environmental aspects of solution chemistry; and other topics of special interest. There will also be a mini-symposium on the chemistry of polyoxometallates.

The scientific program will consist of plenary lectures, invited lectures, and both oral and poster presentations. The conference will be held at the campus of the University of Debrecen. After the conference, attendees will have an opportunity to visit the historical Tokaj wine district, declared a World Heritage Area in 2002.

See Calendar on page 38 for contact information

 www.chemres.hu/28icsc/

Multi-Component Materials

5–8 October 2003, Balatonfüred, Hungary

The **Interfaces and Interphases in Multicomponent Materials Conference**—the result of a merger between the ICCI (International Conference on Composite Interface) and IPCM (Conference on Interfacial Phenomena in Composite Materials)—is intended to bring together research, academic, and industrial scientists.

Interfaces form spontaneously in all heterogeneous systems. The numerous attempts to modify interfacial adhesion and interphase properties are evidence of their importance. Advanced composites cannot be made or applied without good adhesion and appropriate interphase properties. Meanwhile, the interest of the industry, as well as academia, has shifted somewhat from advanced composites to other heterogeneous systems, such as nanocomposites, biomaterials, or natural fiber reinforced composites. As a conse-

quence, the scope of this new conference will reflect these developments.

This meeting will provide the scientific community with the opportunity to present its latest results for discussion at a worldwide forum, create a friendly atmosphere for socializing and strengthening personal ties, offer young scientists an opportunity to present their work and interact with the community, and enable scientists from East and West to meet and discuss issues of common interest.

See Calendar on page 39 for contact information

 <http://interface.pt.bme.hu/>



Medicinal Chemistry

15–18 October 2003, Kraków, Poland

The **Polish-Australian-German-Hungarian-Italian Joint Meeting on Medicinal Chemistry**, organized

under the auspices of the European Federation of Medicinal Chemistry and IUPAC, is the third in a series. The first meeting was held in Taormina, Italy (Italian-Hungarian-Polish, 1999) and the second in Budapest, Hungary (Hungarian-German-Italian-Polish, 2001). In

Where 2B & Y

September 2002, Austria joined the meetings.

The meeting will cover the following topics:

- drugs for the treatment of CNS and cardiovascular diseases
- chemotherapeutics
- combinatorial chemistry and high throughput screening
- molecular modeling

- peptides and peptidomimetics
- pharmaceutical biotechnology

The invited lectures will be published in *Pure and Applied Chemistry*, with sponsorship from IUPAC.

See Calendar on page 39 for contact information

 www.jmpghi.cm-uj.krakow.pl

Bio-Based Polymers

12–14 November 2003, Saitama, Japan

In the last few years, the science and technology of bio-based polymers has increased tremendously in significance. The **1st International Conference on Bio-Based Polymers (ICBP 2003)**—the first in what will be a bi-annual series—will bring together scientists and engineers with an interest in this subject.

Bio-based polymers include various synthetic polymers derived from renewable plant resources and CO₂, biopolymers (nucleic acids, polyamides, polysaccharides, polyesters, polyisoprenoids, and polyphenols), their derivatives, and their blends. Today, research and development on bio-based poly-

mers are important at both academic and industrial research centers.

All conference programs, including plenary lectures, oral presentations, and the exhibition of posters will be held in the Suzuki Umetaro Hall of RIKEN Institute in Saitama, Japan. The official language of the conference is English. The registration fee covers admission to all sessions, abstract book, lunches, coffee, refreshments, and conference banquets on 12 and 13 November. Participants wishing to present a paper are invited to submit a camera-ready abstract for oral or poster presentation by 31 July 2003.

See Calendar on page 39 for contact information

 www.riken.go.jp/lab-www/polymer/icbp2003.html

Solubility Phenomena

25–29 July 2004, Aveiro, Portugal

Solubility phenomena, as with other equilibrium processes, have special significance in a wide range of applications related to daily life, the environment, biology, and industry. The **11th International Symposium on Solubility Phenomena** will cover recent developments in the chemistry of solubility phenomena and related equilibrium processes. Specifically, the conference will deal with applications in chemical and biochemical industry; applications in the environment, agriculture, health, oceanic salt solutions, and mining and industrial wastes; the enhancement of scientific cooperation at the international level; the encouragement of participation by young people in the study of solubility phenomena; increasing the interest in solubility phenomena through promotion of experiments; and debates on applications in secondary and tertiary teaching, including promoting the activities of IUPAC in these areas.

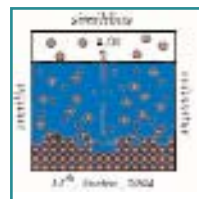
The major topics to be covered in this symposium

include chemical speciation and solubilities, solution thermodynamics, solubility data and computer modeling, polymers and non-electrolytes, solubility in supercritical fluids, geochemical and environmental applications, biomedical applications, and teaching aspects of solubility phenomena. The recent publication of the book *The Experimental Determination of Solubilities* (See page 30) will be used to promote a debate—addressed specifically to young scientists and Ph.D. students—with the editors and several of the authors.

Preliminary registration is available through 15 September 2003. Abstracts may be submitted through 31 January 2004. The final registration deadline is 31 March 2004.

See Calendar on page 40 for contact information

 www.dq.ua.pt/11th_issp/



Where 2B & Y

Organic Synthesis

1–6 August 2004, Nagoya, Japan

The **15th International Conference on Organic Synthesis (ICOS-15)** will be an excellent forum for interaction among many colleagues. Nagoya, Japan, with its status as an industrial center of Asia, is also known as a hub of Japanese culture.

The most prominent aspect of the ICOS-15 program is its numerous high-quality plenary lectures. The following lecturers are already scheduled to speak: Erick M. Carreira (ETH, Switzerland), Peter Dervan (California Institute of Technology, USA), Alois Fürstner (Max-Planck-Institute, Germany), Yves Langlois (University of Paris Sud, France), Steven Ley (Cambridge University, UK), Chun-chen Liao (National Tsing Hua University, Taiwan), Ryoji Noyori (Nagoya University, Japan), Larry E. Overman (University of California Irvine, USA), and John L. Wood (Yale

University, USA). Many more notable scientists are expected.

Contributed papers for symposia and poster sessions are being solicited on the following topics: automated synthesis, bioorganic chemistry, combinatorial chemistry, green chemistry, lewis acid catalysis, new catalysis, new material, oxidation catalysis, polymer synthesis, process chemistry, reduction catalysis, self-assembled molecule, synthesis of natural products, medicinal drugs, and agrochemicals. The deadline for abstract submission is 27 February 2004.



See Calendar on page 40 for contact information

 www.ics-inc.co.jp/icos15/

Chemical Education

3–8 August 2004, Istanbul, Turkey

The **18th International Conference on Chemical Education** is being organized by the Turkish Chemical Society. There will be plenary lectures, invited speakers, and oral and poster sessions to cover modern aspects of chemistry education. There will also be displays and demonstrations of the latest laboratory systems and equipment. Attendees will include professors, chemistry teachers at university, college, senior middle school, and secondary levels, educational researchers, chemistry researchers, and chemical engineers.

The conference will cover the following topics:

- accreditation of chemistry and chemical engineering education
- chemistry education for development
- chemistry and society
- chemistry teacher education
- continuing education
- green chemistry and environmentally friendly chemistry experiments

- international chemistry olympiad
- macromolecules
- microscale chemistry
- modern technologies for chemistry education
- public understanding of chemistry
- science education at elementary level
- teaching and learning chemistry in secondary schools
- theoretical and methodological basis of research in chemistry education

A social program, including a welcome cocktail, banquet, Bosphorous boat trip, opening and closing ceremonies, post-conference tours to Anatolia, and program for accompanying persons will be organized. A second circular will be available in September 2003.

See Calendar on page 41 for contact information

 www.turchemsoc.org/icce/web/

Mark Your Calendar

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

2 0 0 3

6–10 July 2003 • Organo-Metallic Chemistry • Toronto, Ontario, Canada

12th IUPAC International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS-12)

Prof. Mark Lautens, Department of Chemistry, University of Toronto, Toronto, ON M5S 3H6, Canada,
Tel: +1 416 978 6031, E-mail: mlautens@chem.utoronto.ca

7–10 July 2003 • Analytical Chemistry • Gaborone, Botswana

Inaugural Conference for the Southern and Eastern Africa Network of Analytical Chemists (SEANAC)

Dr. Nelson Torto, Department of Chemistry, University of Botswana, P/Bag UB 00704 Gaborone,
Botswana,

Tel: +267 355 2502, Fax: +256 355 2836, E-mail: seanac@mopipi.ub.bw

7–11 July 2003 • Bioinorganic Chemistry • Santa María del Mar, Cuba

II Santa Maria Workshop on Chemistry (SMWC)—devoted to Bioinorganic Chemistry

Prof. Roberto Cao, University of Havana, Faculty of Chemistry, Vedado 10400, Havana, Cuba,

Tel.: +537 879 2145, Fax: +537 873 3502, E-mail: rcaov1946@yahoo.com

14–17 July 2003 • Macromolecules • Prague, Czech Republic

42nd Microsymposium of P.M.M.: Degradation, Stabilization, and Recycling of Polymers

Dr. Drahomir Vyprachticky, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nam. 2, CZ-162 06 Praha 6, Czech Republic, Tel.: +420 2 204 03332, Fax: +420 2

367 981, E-mail: sympo@imc.cas.cz

21–24 July 2003 • Spectroscopy of Macromolecular Systems • Prague, Czech Republic

22nd Discussion Conference of P.M.M. on Spectroscopy of Partially Ordered Macromolecular Systems

Dr. Drahomir Vyprachticky, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nam. 2, CZ-162 06 Praha 6, Czech Republic, Tel.: +420 2 204 03251,

Fax: +420 2 353 57981, E-mail: sympo@imc.cas.cz

9–17 August 2003 • IUPAC 42nd General Assembly • Ottawa, Ontario, Canada

IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org
<www.iupac.org/symposia/conferences/ga03>

10–15 August 2003 • IUPAC 39th Congress—Chemistry at the Interfaces • Ottawa, Ontario, Canada

Chemistry at the Interfaces <www.iupac2003.org>

Conference Management Office, National Research Council Canada, 1200 Montreal Road, Building M-19,
Ottawa, ON, Canada K1A 0R6, Tel.: +1 613 993 0414, Fax: +1 613 993 7250, E-mail: iupac2003@nrc.ca

23–28 August 2003 • Solution Chemistry • Debrecen, Hungary

28th International Conference on Solution Chemistry (28th ICSC)

Prof. Gabor Palinkas, Chemical Research Center, Pusztaszeri ut 59, POBox 17, H-1525 Budapest, Hungary,
Tel.: +36 1 325 9040, Fax: +36 1 325 7554, E-mail: palg@chemres.hu

24–28 August 2003 • Molecular Characterization of Polymers • Bratislava, Slovakia

17th Bratislava International Conference on Macromolecules

Prof. Dusan Berek, Slovak Academy of Sciences, Polymer Institute, Dúbravská cesta 9, SR-842 36

Bratislava, Slovakia, Tel.: +[421] (2) 5477-1641, Fax: +[421] (2) 5477-5923, E-mail: dusan.berek@savba.sk

7–12 September 2003 • Colloquium Spectroscopicum Internationale • Granada, Spain

33rd Colloquium Spectroscopicum Internationale 2003

Prof. Alfredo Sanz-Medel, Department of Physical and Analytical Chemistry, University of Oviedo,
C/Julian Claveria, 8, E-33006 Oviedo, Spain, Tel.: +34 985 103474, Fax: +34 985 103125,

E-mail: asm@sauron.quimica.uniovi.es

10–15 September 2003 • Organic Chemistry • Cavtat-Dubrovnik, Croatia

13th European Symposium on Organic Chemistry (ESOC-13)

Prof. Vitomir Sunjić, Ruder Bosković Institute, Division of Organic Chemistry and Biochemistry, PO Box 180, HR-10002 Zagreb, Croatia, Tel.: +385 1 4571 300, Fax: +385 1 4571 30, E-mail: esoc13@irb.hr

21–26 September 2003 • General and Applied Chemistry • Kazan, Tatarstan, Russia

XVII Mendeleev Congress on General and Applied Chemistry

Prof. Alexander I. Konovalov, A.E. Arbuzov Institute of Organic and Physical Chemistry, Kazan Scientific Center of Russian Academy of Sciences, Arbuzov Str., 8, Kazan 420088, Tatarstan, Russia, Tel.: +7 (8432) 739 365, Fax: +7 (8432) 752 253, E-mail: arbuzov@iopc.knc.ru

5–8 October 2003 • Multicomponent Materials • Balatonfüred, Hungary

Interfaces and Interphases in Multicomponent Materials

Dr. Béla Pukánszky, Budapest University of Technology and Economics, Department of Plastics and Rubber Technology, P.O. Box 91, H-1521 Budapest, Hungary, Tel.: +36 1463 2015, Fax: +36 1463 3474, E-mail: pukan-szky@muatex.mua.bme.hu

13–16 October 2003 • Pesticides • Seoul, Korea

Pesticides: Harmonization of Data Requirements and Evaluation

Prof. Yong-Hwa Kim, Korea Research Institute of Chemical Technology, Toxicology Research Center, P.O. Box 107, Yusong, Taejeon, 305-600, Korea, Tel.: +82-42 860-7490, Fax: +82-42 860-7399, E-mail: yhkim@kitox.re.kr

14–17 October 2003 • Medicinal Chemistry • Kyoto, Japan

5th International Medicinal Chemistry Symposium of the Asian Federation of Medicinal Chemistry (AIMECS 03)

Prof. Yukio Sugiura, Institute for Chemical Research, Kyoto University, Uji, Kyoto 611-0011, Japan, Tel.: +81 774 38 3210, Fax: +81 774 32 3038, E-mail: sugiura@scl.kyoto-u.ac.jp

15–18 October 2003 • Medicinal Chemistry • Krakow, Poland

Polish-Austrian-German-Hungarian-Italian Joint Meeting on Medicinal Chemistry

Prof. Zdzisław Chilmonczyk, National Institute of Public Health, Chemska 30/34, PL-00-725 Warsaw, Poland, Tel.: +48 22 851 52 29, E-mail: chilmon@il.waw.pl

12–14 November 2003 • Bio-Based Polymers • Saitama, Japan

1st International Conference on Bio-based Polymers (ICBP 2003)

Dr. Yoshiharu Doi, Polymer Chemistry Laboratory, RIKEN, 2-1 Hirosawa, Wako-shi, Saitama 351-0198, Japan, Tel.: +81 48 467 9402, Fax: +81 48 462 4667, E-mail: ydoi@postman.riken.go.jp

24–27 November 2003 • Polymers • Bangkok, Thailand

The 8th Pacific Polymer Conference

Prof. S. Tantayaanon, Chulalongkorn University, Department of Chemistry, Bangkok, 10330, Thailand, Tel.: +66 2 218 4968, E-mail: supawan.t@chula.ac.th

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6–9 January 2004 • Polymer Characterization • Guimaraes, Portugal

12th Annual Polychar World Forum on Advanced Materials (POLYCHAR 12), [a one-day course on polymer characterization is scheduled on 5 Jan 2004]

Prof. Antonio M. Cunha, Department of Polymer Engineering, University of Minho, P-4800-058 Guimaraes, Portugal, Fax: +351 253510339, E-mail: amcunha@dep.uminho.pt

26–31 January 2004 • Biodiversity and Natural Products • Delhi, India

International Conference on Biodiversity and Natural Products: Chemistry and Medical Applications (combining ICOB-4 and ISCNP-24)

Prof. V.S. Parmar, Department of Chemistry, University of Delhi, Delhi 110 007, India, Tel.: +91 11 2766 6555, Fax: +91 11 2766 7206, E-mail: virparmar@yahoo.co.in

Mark Your Calendar

9–10 March 2004 • Heterocyclic Chemistry • Gainesville, Florida, USA

5th Florida Heterocyclic Conference

Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, PO Box 117200, Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

17–21 May 2004 • Mycotoxins and Phycotoxins • Maryland, USA

11th International Symposium on Mycotoxins and Phycotoxins (ISMP-11)

Dr. Douglas Park, Food and Drug Administration, CFSAN, 200 C Street, SW, Washington, DC 20204, USA, E-mail: dpark@cfsan.fda.gov

27 June–1 July 2004 • Biomolecular Chemistry • Sheffield, UK

7th International Symposium on Biomolecular Chemistry (ISBOC-7)

Prof. George M. Blackburn, University of Sheffield, Department of Chemistry, Sheffield, S3 7HF, UK, Tel.: +[44] 114 222 9462, Fax: +[44] 114 273 8673, E-mail: g.m.blackburn@sheffield.ac.uk

27 June–2 July 2004 • Coordination and Organometallic Chemistry of Germanium, Tin, and Lead • Santa Fe, New Mexico

XIth International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin, and Lead

Prof. Keith Pannell, Department of Chemistry, University of Texas at El Paso, El Paso, TX 79968-0513, Tel.: +1 915-747-5796, Fax: +1 915-747-5748, E-mail: kpannell@utep.edu

4–9 July 2004 • Phosphorus Chemistry • Birmingham, England

16th International Conference on Phosphorus Chemistry (ICPC 16)

Prof. Pascal Metivier, Rhodia, R&D for Phosphorous and Performance Derivatives, Oak House, reeds Crescent, Watford, WD24 4QP, UK, Tel.: +44 1923 485609, E-mail: pascal.metivier@eu.rhodia.com

12–15 July 2004 • Polymer Biomaterials • Prague, Czech Republic

43rd PMM Microsymposium: Polymer Biomaterials: Biomimetic and Bioanalogous Systems

Drahomir Vyprachticky, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovskeho nam. 2, CZ-162 06 Praha 6, Czech Republic, Tel.: +420 2 204 03332, Fax: +420 2 367 981, E-mail: sympo@imc.cas.cz

18–21 July 2004 • Chemical Sciences in Changing Times • Belgrade, Yugoslavia

4th International Conference of the Chemical Societies of the South-Eastern European Countries on Chemical Sciences in Changing Times

Prof. Ivanka Popovic, Belgrade University, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Yugoslavia, Tel.: +381 11 337 0478, Fax: +381 11 337 0473, E-mail: ivanka@elab.tmf.bg.ac

18–23 July 2004 • Polymers and Organic Chemistry • Prague, Czech Republic

11th International Conference on Polymers and Organic Chemistry 2004 (POC '04)

Dr. Karel Jerabek, Institute of Chemical Process Fundamentals, Rozvojova 135 165 02 Prague 6, Czech Republic, Tel.: +420 220 390 332, Fax: + 420 220 920 661, E-mail: kjer@icpf.cas.cz

25–29 July 2004 • Solubility Phenomena • Aveiro, Portugal

11th International Symposium on Solubility Phenomena, Including Related Equilibrium Processes (11th ISSP)

Prof. Clara Magalhaes, Department of Chemistry, University of Aveiro, P-3810-193 Aveiro, Portugal, Tel.: +351 234 401518, Fax: +351 234 370084, E-mail: mclara@dq.ua.pt

1–6 August 2004 • Organic Synthesis • Nagoya, Japan

15th International Conference on Organic Synthesis (ICOS-15)

Prof. Minoru Isobe, ICOS15 Secretariat, c/o International Communications Specialists, Inc., Sabo Kaikan-bekkan, 2-7-4 Hirakawa-cho, Chiyoda-ku, Tokyo 102-8646 Japan, Tel: +81-3-3263-6474, Fax: +81-3-3263-7537, E-mail: icos@ics-inc.co.jp

2–7 August 2004 • Chemistry in Africa • Arusha, Tanzania

9th International Chemistry Conference in Africa—Chemistry Towards Disease and Poverty Eradication

Dr. G.S. Mhinzi, University of Dar es Salaam, Chemistry Department, PO Box 35061, Dar es Salaam, Tanzania, Tel./Fax: +255 22 2410038, E-mail: mhinzi@chem.udsm.ac.tz

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3–8 August 2004 • Chemical Education • Istanbul, Turkey

18th International Conference on Chemical Education (18th ICCE)

Prof. Dr. Mustafa L. Berkem, Chairman, Marmara University, Ataturk Faculty of Education, TR- 81040 Goztepe-Istanbul, Turkey, Tel: +90 2163459090/231, Fax: +90 2163388060, E-mail: haleb@ttnet.net.tr or icce2004@marmara.edu.tr

15–20 August 2004 • Physical Organic Chemistry • Shanghai, China

17th IUPAC Conference on Physical Organic Chemistry, (ICPOC-17)

Prof. Guo-Zhen Ji, Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, 354 Fenglin Road, Shanghai 200032, China, Tel: +86 21-64163300, Fax: +86 21-64166128, E-mail: jigz@pub.sioc.ac.cn

17–21 August 2004 • Chemical Thermodynamics • Beijing, China

18th IUPAC Conference on Chemical Thermodynamics

Prof. Haike Yan, Chairman, 18th ICCT c/o Chinese Chemical Society, PO Box 2709, Beijing, 100080, China, Tel.: +86 10 62568157, 86 10 62564020, Fax: +86 10 62568157, E-mail: qiuxb@infoc3.icas.ac.cn

3–5 September 2004 • Chemistry of Vanadium • Szeged, Hungary

4th International Symposium on Chemistry and Biological Chemistry of Vanadium

Prof. Tamas Kiss, University of Szeged, Department of Inorganic and Analytical Chemistry, PO Box 440, H-6701 Szeged, Hungary, Tel.: +36 62 544337, Fax: +36 62 420505, E-mail: tkiss@chem.u-szeged.hu

17–22 October 2004 • Biotechnology • Santiago, Chile

12th International Biotechnology Symposium

Prof. Juan A. Asenjo, Centre for Biochemical Engineering and Biotechnology, University of Chile, Beauchef 861, Santiago, Chile, Tel.: +56 2 6784288, Fax: +56 2 6991084, E-mail: juasenjo@cec.uchile.cl or IBS2004@conicyt.cl

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