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Making Modernity

PAC at Your Fingertips

IUPAC—Then and Now

CHEMISTRY International

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From the Editor

Who better to discuss the history and accomplishments of IUPAC's scientific journal than James Bull, scientific editor of *Pure and Applied Chemistry*. In this issue of *CI* (page 6), Professor Bull—who has been at the helm of *PAC* for eight years—reviews with enthusiasm the life and path of the only scientific journal the Union has ever had.

This year saw the publication of the 80th volume of *PAC*, as well as the completion of the online digital archive of every issue. With the entire journal readily available, an important part of IUPAC history is now revealed. In his article, Bull invites us to take stock of how *PAC* was started and how it was shaped over time. He quotes an earlier paper by IUPAC presidents, reminding us that the Publications Committee at that time (in 1960) "was particularly preoccupied with the need to provide a reliable and readily accessible medium for IUPAC reports and recommendations, as well as papers based upon the scientific proceedings of selected conferences."

The same concern remains today. Meanwhile, the practices and standards for scientific publication have continuously boomed with new IT, but just like larger publishers, *PAC* has an online submission system, a production workflow that benefits the authors, and features such as CrossRef participation. Today's Committee on Printed and Electronic Publication (CPEP) continues to press the Union to adopt the best practices of scientific journals but also to consider the future. Plans are being considered to allow for the release of articles ASAP (As Soon As Publishable) online. Other considerations include the coding of INCHI and INCHIKey.

Besides the journal, the impact of other IUPAC publications is also worth mentioning. One book that is highly relevant to IUPAC work and to the chemistry community at large is the new edition of the *International Vocabulary of Metrology*, known as the VIM. Ten years in the making, the VIM has been approved and adopted by each of the eight Joint Committee for Guides in Metrology member organizations, including IUPAC (see page 21).

All of this brings to mind something that Peter Mahaffy, current chair of the IUPAC Committee on Chemistry Education, wrote. Although he was discussing climate change, his statement that "Credibility of resources is so incredibly important in this area" is surely not restricted to that subject matter. IUPAC, with its journal *PAC* and other publications such as VIM, and with other recognized organizations, owe the scientific community no less than the most credible and useful resources.

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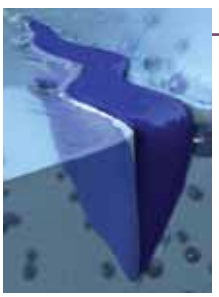
***Cover:** An evening shot of the buildings that comprise the Chemical Heritage Foundation. To the left is CHF's new state-of-the-art museum and conference center. Read more about the museum and its exhibits on page 3.* Cover photograph by Rich Dunoff.

Contents

CHEMISTRY International November-December 2008 Volume 30 No. 6



Stamps International 12

Past President's Column

Membership in IUPAC *by Bryan Henry* 2

Features

Making Modernity at the Chemical Heritage Foundation *by Margo Bresnen* 3

Pure and Applied Chemistry at Your Fingertips *by James Bull* 6

IUPAC—Then and Now: Reflections on 40 Years of Involvement *by Jeffery Leigh* 9

IUPAC Wire

CHEMRAWN VII Prize for Atmospheric and Green Chemistry 13

Inviting Young Chemists to the 42nd IUPAC Congress in Glasgow 13

XML Gold Book—2.0 release 14

The Project Place

Revision of the Silver Book 15

A Glossary of Concepts and Terms in Chemometrics 15

Options for IUPAC Engagement in SAICM Implementation 16

Provisional Recommendations *IUPAC seeks your comments* 17

Making an imPACt

Recommendations on Measurement and Analysis of Results Obtained on Biological Substances Using Isothermal Titration Calorimetry 18

Nomenclature for Rotaxanes and Pseudorotaxanes 18

Solubility Data Series 19

Bookworm

Self-Healing Materials: An Alternative Approach to 20 Centuries of Materials Science 20

International Vocabulary of Metrology—Basic and General Concepts and Associated Terms 21

Systematic Nomenclature of Organic, Organometallic and Coordination Chemistry 23

Mycotoxins and Phycotoxins: Proceedings of the XIIth International IUPAC Symposium 23

Conference Call

The Chemistry of the 21st Century—State of the Art *by Mª Angeles Monge, Pilar Goya, and José Elguero* 24

Polymers at the Frontiers of Science and Technology *by Christopher K. Ober* 25

Solid State Chemistry *by Milan Drábik, Peter Komadel, Tomáž Grygar* 26

Carbohydrates *by Berit Smestad Paulsen* 27

Organic Synthesis *by Sung Ho Kang* 28

Where 2B & Y 30

Mark Your Calendar 32

Index for 2008 34

Membership in IUPAC

by Bryan Henry

We are constantly attempting to widen the influence of IUPAC by reaching out to new members. We currently have 51 National Adhering Organizations (NAOs) and 16 Associate National Adhering Organizations (ANAOs). If you look at a map with our members identified, it is clear that we are truly an international organization with impressive membership representation in North America, Europe, Asia, and the South Pacific. However, there are clear gaps in Africa and South America.

Recently, we revised an existing committee with the aim of providing a new concentration on membership activities. While the **Membership Relations Committee** will continue to recruit new members, it will also focus on making sure that we are meeting the needs and expectations of our current members. In particular, we need to find ways to improve communication. IUPAC is involved in a number of exciting and worthwhile activities and we need to make our members more aware of what we are doing. Communication will take on a new urgency as we approach 2011 and the proposed International Year of Chemistry.

Membership retention and communication with members are matters too important to be left as the sole responsibility of a single committee.

Initially, the top priority of the committee will be to address the relatively urgent challenge of soliciting the full membership of all current ANAOs. Associate National Adhering Organizations have observer status in IUPAC. The ANAO program was intended to introduce a national organization representing chemistry in a particular country to IUPAC and its many activities. The dues were set at a very low rate and the hope was that after an introductory period the organization would move to full NAO status. During the 2005 meeting of the Bureau, this policy was endorsed and a four-year limit was imposed on ANAO status. As a result, most of the current ANAOs must become full members by 2010 or they will lose their status. I am glad to report that over this past year, a few ANAOs have already submitted their applications to become full NAOs in 2010.

A first step in this strategy was to write to all ANAOs reminding them of the existing policy and encouraging them to become NAOs. The letter summarizes some of the benefits of NAO status (see box below). In particular, the opportunity to host IUPAC-sponsored conferences is only open to NAOs. Such conferences generally provide an infusion of resources into the local economy that often outweighs the amount paid for a national subscription. Another initiative was to assign responsibility for each ANAO to a member of the committee so they can follow up the letter with personal contact and a direct source of information.

This same step has been taken with the NAOs; each one has been assigned to a Bureau member. Communications to NAOs are sent out by the Secretariat to the adhering organizations. The Bureau NAO contacts will provide another more informal channel to discuss any matters arising from these official messages. The overall purpose is to increase communication.

Membership retention and communication with members are matters too important to be left as the sole responsibility of a single committee. All of us within IUPAC should contribute. We welcome your help and invite anyone with specific suggestions to contact the committee.

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

Members' Benefits Explained

- "Why on Earth Be(come) an IUPAC Member?" Nov 2007 *CI*, p. 2 www.iupac.org/publications/ci/2007/2906/oc.html
- Hints 2.2—An Informal Review of IUPAC Members' Benefits, Duties and Functions, and Relevant Programs www.iupac.org/general/hints.html

Making Modernity

at the Chemical Heritage Foundation

by Margo Bresnen

Ten years ago, a group of chemists approached the Chemical Heritage Foundation (CHF) in Philadelphia, Pennsylvania, USA, with a challenge: to collect as many as possible of the instruments that proved crucial to the advance of chemistry. The foundation's quick success in this endeavor soon gave rise to a new challenge: to use these objects, in addition to CHF's unparalleled collections of fine art, rare books, archival material, and other scientific artifacts, to bring to life the exciting, untold story of the chemical and molecular sciences for a too-often unaware public audience.

How best to do this? Earlier this fall, CHF unveiled a state-of-the-art museum and conference center. The museum component of this $20 million, 18 000-square-foot project includes the Masao Horiba Exhibit Hall, home to the Arnold O. Beckman Permanent Exhibit, and the Clifford C. Hach Gallery for changing exhibitions. Four years in the making, the extensively renovated space was made possible by bringing together some of the best minds in museum design. The new space conforms to "green" building principles and the sustainability standards of CHF.

Making Modernity

Ralph Appelbaum Associates (RAA), the world's largest interpretive museum design firm, and Dagit•Saylor Architects (now SaylorGregg Architects) worked hand in hand with CHF staff to realize *Making Modernity*, the major new permanent exhibition installed in the Horiba Exhibit Hall. As Robert G.W. Anderson, a CHF board member and former director of the British Museum, describes it, *Making Modernity* "tells an intriguing story of human endeavor and relates scientific pursuit with those practical end products which have transformed our lives."

The unique nature of CHF's collection posed challenges for RAA. The firm, whose notable projects include the National Constitution Center in Philadelphia and the U.S. Holocaust Memorial Museum in Washington, D.C., is known for tackling specialized subjects and extracting stories from objects. But chemistry's long, complex history does not make for a simple narrative, and the objects and documents of scientific heritage can be visually dull.

Still, CHF's curators and historians insisted that the collection tell its own story of vital significance. In *Making Modernity*, science drives the tale. The education level of CHF's typical visitor allowed RAA to set a high bar for the collection's interpretation. RAA project director Tim Ventimiglia says, "The project is very focused, and we're excited about the serious level of the scholarship."

Making Modernity's *two-story "video column" features 18 high-tech screens. A film that brings the periodic table to life plays on a continuous loop.* Photo by Tim Ventimiglia.

Students from a local charter school tour Making Modernity. Photo by Rich Dunoff Photography.

Making Modernity's 24 sections illustrate 8 thematic arcs ranging from chemistry's origins to the role science plays in the modern world. Each section presents a story based on a person or group of people and displays items that convey the history of a given innovation or idea. The section entitled "Chemistry and the Public Good," for example, features scientists who became public advocates during the Industrial Revolution. It includes Louis Pasteur's 1865 letter upbraiding French winemakers for not adopting pasteurization, as well as photographs, journals, and popular magazines from the period.

Left: The new museum inhabits CHF's oldest wing, shown here under construction in April 2006. Photo by Gregory Tobias. ***Right: Visitors gather before a display of medical instrumentation in*** **Modern Modernity.** Photo by Rich Dunoff Photography.

Other sections expose the chemistry behind Isaac Newton's work, early dyes, Bunsen burners, thermometers, Geiger counters, computers, fuel cells, buckyballs, and much more. They are arranged to help visitors draw connections between different scientific insights and eras. For instance, the area devoted to synthetics pairs a display about celluloid, an artificial compound made in part from natural matter, with one about Bakelite, a completely artificial material. The synthetics story continues with nylon, which revolutionized the textile industry in the mid-20th century, and GORE-TEX, a membrane used today with equal success in outerwear and surgical implants.

The centerpiece of *Making Modernity* is a two-story "video column." The tower's 18 screens play a 14-minute continuous loop of the periodic table in motion. The film was produced by Theodore Gray, the cofounder of Wolfram Research famous for his periodic-table table and poster, and filmmaker Max Whitby. Each element is represented by a filmed demonstration, which cycles through a cascading hierarchy on the column that can also be manually manipulated, turning the periodic table into an engaging interactive experience.

Because science is ever-evolving, *Making Modernity* was designed to allow a degree of flexibility. Principal architect Peter Saylor constantly kept the presentation of CHF's collection in mind as he plotted the renovation of the 1865 wing of CHF's headquarters. He describes the plan as "a contemporary intervention into a classic building for a project where a collection of world-class artifacts is integral to the architecture. It gives CHF a cutting-edge way to deliver a history which is one of rapid change."

Molecules that Matter

The Hach Gallery, the adjoining space devoted to science-themed rotating exhibitions, also allows for change. Because CHF has strong relationships with the Smithsonian and other loaning institutions, it was important to reserve room for temporary installations that offer something new to returning visitors.

Above: A molecular model of DDT at 2.5 billion times actual size hangs in **Molecules that Matter.** ***Left: Guests mingle around the centerpiece of*** **Making Modernity** ***during the grand opening.*** Photos by Rich Dunoff Photography.

Making Modernity at the Chemical Heritage Foundation

Left: The exhibition spaces originally housed Philadelphia's First National Bank, built in 1865. Photo by Gregory Tobias. ***Right: CHF's president and CEO, Thomas R. Tritton, at far right, toasts the museum's unveiling.*** Photo by Rich Dunoff Photography.

According to Erin McLeary, a curator at CHF, the space "will also function as a recruitment tool for future donations and loans. Visitors will come to think of us as the appropriate stewards for artifacts that they themselves own."

The Hach Gallery's first exhibition, *Molecules that Matter*, was developed by CHF in collaboration with the Frances Young Tang Teaching Museum and Art Gallery at Skidmore College in Saratoga Springs, New York, USA. The fascinating traveling exhibition showcases 10 organic molecules, each associated with one decade of the 20th century, which profoundly altered modern life. The molecules' scientific and sociological implications are explored through contemporary art, historical artifacts, and large-scale molecular models. For more on this exhibit, see the Nov-Dec 2007 issue of *CI*, page 32.

To fully seize the opportunity presented by hosting this exhibition, CHF organized a companion lecture series in which Robert S. Langer, Eric Roston, Chrissy Conant, Sandra Steingraber, and Dawn A. Bonnell—all leaders in their respective fields—offer their perspectives on the molecules, on the science in everyday experiences, and on the promise and peril of discovery and innovation. These lectures are one more way that CHF encourages the general public to become informed about and engaged with the scientific progress it preserves and promotes. Major challenges facing the world today demand a better public understanding of modern science—the ultimate end to which CHF's new museum aims.

Located in the heart of Philadelphia's historic Old City, CHF's E.I. du Pont Conference Center features a range of fully equipped rooms with prime views of Independence National Historical Park. The 13 500-square-foot facility allows for a variety of configurations, includes all of the amenities required for successful meetings and events, and is centrally located near such major attractions as the Liberty Bell and National Constitution Center. It also adjoins CHF's new exhibition spaces. Able to accommodate up to 400 people, the center is available to select groups. For more information about the rooms or to reserve a space, please call 877-CHF-4500 or visit www.chfconferencecenter.org.

To learn more about the renovation, *Making Modernity*, *Molecules that Matter*, the lecture series, or how to visit CHF, go to www.chemheritage.org.

Making Modernity is made possible by the generous support of the Arnold and Mabel Beckman Foundation. Funding for *Molecules that Matter* has been provided by The Camille and Henry Dreyfus Foundation, the Hach Scientific Foundation, Amgen, the Friends of the Tang, and donors to CHF.

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www.chemheritage.org

Pure and Applied Chemistry at Your Fingertips

by James Bull

The task of refurbishing the IUPAC website is ongoing, and many users will be aware of constant changes and improvements. However, a historical milestone was recently passed without the fanfare that it deserves. During July 2008, a full digital archive of all *Pure and Applied Chemistry* (*PAC*) articles was completed, reaching back to Volume 1 in 1960! This reveals a comprehensive published record of the Union's activities during a decisive period in its history.

Appropriately, the first issue of *PAC* commences with an orientational foreword and an introductory article entitled "The Organization and Functions of the International Union of Pure and Applied Chemistry (I.U.P.A.C.)."[1] Authored by two notable IUPAC stalwarts, W. Albert Noyes, Jr. (then president) and Harold W. Thompson (president from 1973–1975), this article provides a brief historical overview of activities and the emergence of structures upon which the present-day organization is based. Importantly, the need for "publishing and disseminating the Union's work" is recognized in the founding terms of reference for *PAC*. The Publications Committee at that time was particularly preoccupied with the need to provide a reliable and readily accessible medium for IUPAC reports and recommendations, as well as papers based upon the scientific proceedings of selected conferences. These complementary contents have endured throughout the past 58 years to furnish an unparalleled information resource.

We can now study the history of events, topics, IUPAC projects, and authors with unprecedented ease.

This online archive is free and readily accessible to all. We can now study the history of events, topics, IUPAC projects, and authors with unprecedented ease. The ensuing overview introduces this extraordinary new IUPAC resource, and is an invitation to readers to celebrate this milestone by addressing future challenges and opportunities armed with awareness of an eventful and illustrious past.

Conference Papers

Conference coverage during the early years of *PAC* was characterized by many exploratory ventures. Some resulted in one-off collections or short-lived series of works, but multidisciplinary or occasionally selective coverage of the IUPAC Congresses rapidly became a traditional biennial feature. Although discontinuities occurred during the 1980s and 1990s, Congress coverage epitomizes the global and multidisciplinary reach of the Union, and has now been restored as a regular feature.

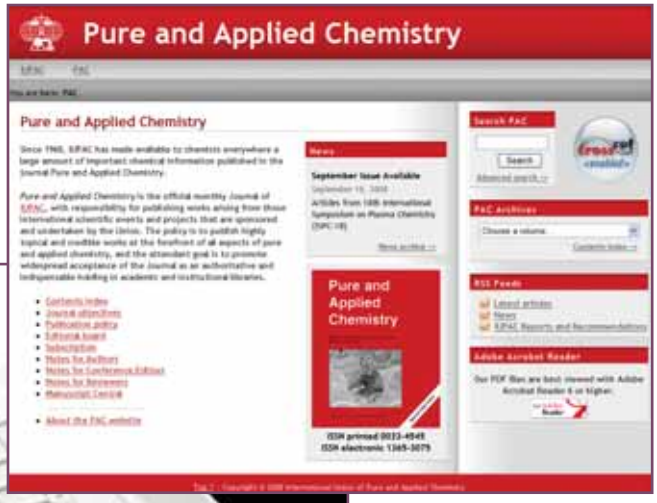
The inexorable emergence of a group of mainstream topics played a major role in shaping the culture of the journal, and current content is dominated by regular and predictable coverage of these targeted subdisciplines. The website conference indexes now offer access to comprehensive records of their origins and development, and thus also to the chronology and advances of many branches of the chemical sciences during recent decades.

Here we discover, for example, that the International Symposium on the Chemistry of Natural Products (ISCNP), which took place in Australia during August 1960 and generated a comprehensive collection of papers in 1961,[2] inaugurated a biennial series that has since flourished without interruption to the present day. That first collection was introduced by the text of an opening address by Alexander Todd,[3] parts of which are uncannily prescient. Although the subject continues to evolve in exciting and sometimes unexpected ways, his vision of challenges and opportunities is timeless, and is as faithfully reflected in the most recently published collection[4] arising from the 26th ISCNP (Kyoto, Japan, July 2006), now consolidated with the Biodiversity (ICOB) series.

Another enduring theme, exemplified by early publications arising from a Symposium on Thermodynamics (Fritzens-Wattens, Austria, August 1959), a Symposium on Thermodynamics and Thermochemistry (Lund, Sweden, July 1963), and an International Conference on Thermodynamics (Cardiff, UK, April 1970), evolved into the modern series on Chemical Thermodynamics.[5] Similarly, an International Symposium on Organic Photochemistry (Strasbourg, France, July 1964),[6] was the harbinger of the now more inclusive biennial Symposia on Photochemistry. The archive also reveals

that the current series on Solution Chemistry was launched in 1988, but was numbered 19th to take cognisance of the sum total of events in two serial antecedents entitled Non-Aqueous Solutions, and Solvent-Solvent-Solute Interactions.

Additional series have started up over the years, and some continue to prosper whilst others have been terminated or been lost to other media. *PAC* presently relies heavily on a core group of about 12 regular (mainly biennial) events for predictable conference coverage. This is supplemented by windfall publication projects arising from occasional, start-up, or even one-off events that meet the cardinal criteria of international status and authorship, and serve the need for scientific relevance and topicality in the published record. Collectively, these sources generate up to about 2 000 journal pages of conference coverage annually. This historical record is now fully revealed in the website conference index.



Special Topics

An initiative to invite papers or collections of papers on topics of compelling scientific interest was formalized as a regular offering in 1999: Special Topic features. These projects have indeed added a refreshing new dimension to *PAC*,[7] and heralded the subsequent transformation of publication policy to optimize publication coverage and standards.[8] The current regime is based on central editorial oversight and online manuscript management and peer review, which has contributed materially to the growing international credibility and citation performance of the journal.[9] Special Topics projects provided much of the impetus and experience for the emergence of this publication policy, and continue to give prominence to selected content.

The website displays a full inventory of Special Topic issues since 1996. Fittingly, the IUPAC initiative on New Directions in Chemistry finds a place here, through the published outputs of the first two Workshops for Advanced Materials. Other notable achievements include a pioneering Green Chemistry project and two monumental inter-Union projects dealing with Endocrine Active Substances. More recent Special Topic issues have served to celebrate events in some of the most successful series that currently receive regular coverage in *PAC*.

Occasional stand-alone Special Topic articles have also been published by invitation, and an annual Special Topic feature recognizes those young chemists whose short essays on their Ph.D. theses have been rewarded with an IUPAC Prize for Young Chemists. They are invited to submit short critical reviews for evaluation as possible *PAC* contributions, which has resulted in a gratifyingly comprehensive record of exceptionally well-received papers.

IUPAC Technical Reports and Recommendations

Until 1960, the Union was concerned that "there was no systematic or unified policy with regard to the publication of reports and papers."[1] It is recorded that nomenclature rules for different branches of chemistry seemed to enjoy ready international dissemination through national societies and journals, whereas other important outputs were less publicized.

This was rectified with the advent of *PAC*, which has since served as the definitive repository of all the outputs of commissions, sections, and divisions. The website archive now offers access to this mas-

sive resource, sorted chronologically and by division. It thus captures overall and subdisciplinary histories, which promise to serve the Union and general readership in hitherto unimagined ways. In macrocosm, we can literally trace the evolution of language and conventions in the chemical sciences, as well as the rise (and fall) of topical issues and controversy. Divisions can now study their roots and growth as reflected in published outputs, as well as the origin and development of discrete projects.

Conclusion

History tells us that *Pure and Applied Chemistry* was founded on an ideal of service to the international scientific community, and that it has always occupied a unique niche in the array of publications that serve the chemical sciences. However, it is also judged by the normal criteria that apply to scientific media, and continues to compete for recognition as an authoritative and indispensable resource. The website archive is a repository of a distinguished record over the past 48 years, and serves to demonstrate that the ideal and its implementation constitute a sound basis for continuity. Thus, publication policy continues to be centered on the publication of collections of papers arising from authoritative lectures presented at IUPAC-sponsored events, as well as from recommendations, technical reports on standardization, recommended procedures, data compilations, and collaborative studies of IUPAC bodies.

Of course, the mechanisms of scientific communication are in flux during this burgeoning electronic age, and it is unclear how the future of *PAC* will unfold. However, it is clear that predictable and regular coverage of mainstream chemistry events is a prerequisite for adequate authorship support and readership interest. Authorship by invitation is an uncertain and sometimes contentious basis for publication policy, but this approach has sustained the journal while evolving responsively to a changing publication culture. It was formerly customary to invite plenary presenters to contribute papers based upon their conference presentations, in the expectation that these would be routinely accepted by the conference editor. This practice has given way to conventional peer review, as an essential feature of quality control, and discretionary extension of invitations to nonplenary participants in major events. Trends in the performance of the journal are closely analyzed, and it is evident that these twin strategies provide a sound basis for a bright future and ongoing enrichment of the website archive.

References

1. W.A. Noyes, Jr. and H.W. Thompson, *Pure Appl. Chem.*, **1**, 5–14 (1960)
2. Natural Products ISCNP-1, *Pure Appl. Chem.*, **2**, 349–635 (1961)
3. Sir Alexander Todd, *Pure Appl. Chem.*, **2**, 359–366 (1961)
4. Natural Products and Biodiversity ISCNP-25 ICOB-5, *Pure Appl. Chem.*, **79**, 469–823 (2007)
5. Chemical Thermodynamics, *Pure Appl. Chem.*, **2**, 5–338 (1961); ibid., **8**, 89–214 (1964); ibid. **22**, 215–548 (1970)
6. Photochemistry, *Pure Appl. Chem.*, **9**, 461–621 (1964)
7. J.R. Bull, *Chem. Int.*, **22**, 105–107 (2000); idem, ibid., **24**(5), 7 (2002)
8. J.R. Bull, *Chem. Int.* **25**(5), 10-12 (2003)
9. The recent citation performance of *Pure Appl. Chem.* will be analyzed in a forthcoming *Chem. Int.* article.

James R. Bull <James.Bull@uct.ac.za> is a professor at the University of Cape Town in South Africa. Since 2000 he has been scientific editor of *Pure and Applied Chemistry*.

www.iupac.org/publications/pac

Reflections on 40 Years of Involvement

by Jeffery Leigh

Many people have asked me what I actually have done during my time of involvement with IUPAC, which is now approaching 40 years, especially since a yearly trip to whatever exotic spot chosen for a meeting is no longer seen as being much of a perk. Others want to know what the organization does. That, at least, is easy to answer. IUPAC's mission, the reason for its existence, is to enable chemists to communicate unequivocally and without misunderstanding. In particular, IUPAC ensures that different authorities do not start arguing at cross purposes because they are not sure that the subject of their discussion is understood by both parties. Regulatory authorities, publishers, and researchers are aware of this problem and ask for an independent authority to advise them on such matters. That authority is IUPAC.

One of IUPAC's most important tasks is to develop a universal *systematic* nomenclature for chemical compounds. This was what first attracted me to IUPAC. I started by being intrigued by a kind of cross-word approach to nomenclature: Could you define a name by a set of rules that would always allow anyone to infer the chemical structure from it? This was before the routine availability of computers, which have changed the way in which chemical information is stored and manipulated.

Another aspect of IUPAC's work involves standardization. For example, estimates of atomic weights are still being made, and though changes in established values are small, they are important in some circumstances. IUPAC continuously assesses the new literature and amends the list of atomic weights every two years. Isotopic abundances for a given element are not independent of source, as was once believed, and they vary from place to place and from heavenly body to heavenly body. IUPAC also reviews new data in this area.

IUPAC advises chemists on how to assess statistical data, on how to present analytical results, and on how to teach chemistry, particularly in emerging regions with limited resources, by providing teaching aids and advice, and organizing conferences. IUPAC publishes the results of its deliberations in its scientific journal *Pure and Applied Chemistry* and a variety of references listed below.

IUPAC sponsors conferences, and one condition for IUPAC sponsorship is that the government of the host country will issue visas to bona fide scientists who wish to attend, no matter from which country they come. This was particularly important during the Cold War and is still necessary in some regions such as the Middle East. Finally, IUPAC encourages interaction between industry and academia, considering and publicizing the value and the dangers of chemistry for the world as a whole.

One of IUPAC's most contentious functions, carried out jointly with IUPAP, its sibling physics organization, is to assess researchers' claims to have synthesized a new element, and adjudicate on priority. Only when this has been done are the discoverers invited to suggest a permanent trivial name. Most go for famous compatriots or home towns and states. Thus, we now use names such as seaborgium, hassium, dubnium, and californium. In the meantime, IUPAC has devised the peculiar three-letter symbols and related names for elements that are yet to be prepared beyond all reasonable doubt, but which are discussed in the literature. The element of atomic number 111 was provisionally called unununium, symbol Uuu, until recently, when IUPAC recognized that it had been synthesized unequivocally by researchers in Germany, who have now given it the permanent name roentgenium, with the symbol Rg. This name is to honor the German discoverer of X-rays, Wilhelm Roentgen. Evidence for the element 112, Uub, ununbium, is currently being assessed. When the Dubna and Berkeley laboratories were competing in a race to establish new elements in the 1980s, there were some unpleasant and difficult political pressures applied to the chairmen of the commissions. To their credit, all parties finally accepted the IUPAC decisions.

I started by being intrigued by a kind of cross-word approach to nomenclature: Could you define a name by a set of rules that would always allow anyone to infer the chemical structure from it?

The activities mentioned above have always been principal aims of IUPAC, but how the Union approaches them has changed significantly since I first became involved. I attended my first meeting, which was of the

Commission on Nomenclature of Inorganic Chemistry (CNIC), as a stand-in because they could find no one to act as meeting secretary. My boss at work was Joseph Chatt, a long-time IUPAC enthusiast. At home, we subordinates were frustrated by his insistence that we use correct IUPAC nomenclature, which we didn't appreciate or understand. It was a laboratory joke that everything in a written report had to be presented with a plethora of square brackets in order to satisfy Joseph. He would disappear from the country annually for mysterious IUPAC meetings, but eventually he asked me if I were prepared to come to Munich to act as secretary for this one meeting of CNIC. As I had worked in Munich with E.O. Fischer, and was very fond of the city, I was delighted to do so. This was in 1973, and I have been a member of IUPAC in one capacity or another ever since.

. . . it was always necessary to reach the conclusion that the chairman wanted, and on many occasions we worked from nine till nine, when the exhausted and hungry members of the commission finally capitulated.

When I first became involved in IUPAC, the secretariat was run by Mo (Maurice) Williams and his devoted assistant Ann Troughton. The office was housed in a small shopping mall on the outskirts of Oxford. Chatt relied on the IUPAC office for considerable help, even in arranging his journeys to meetings. Mo also seems to have been a part-time travel agent. Certainly he and Ann were the most permanent aspect of the administration of the Union. Most of the archives were carried about in Mo's head. Members of the commissions did not worry much about finance since Mo handled everything. Nowadays, the permanent staff occupies a small office with five employees in North Carolina and an even smaller office with one proud independent employee in Boston, both in the United States. Everything is much more professional, but, unavoidably, less personal. The use of e-mail rather than the telephone, more efficient but requiring much less human interaction, has undoubtedly caused this to happen.

Most of the archives were carried about in Mo's head.

A main characteristic of CNIC (and of its sister Commission on Nomenclature of Organic Chemistry, CNOC) at that time was its iron-willed chairman. It became evident to me that CNIC had no defined program apart from the plans of the chairman. Most of the members of CNIC and CNOC had been in their posts for many years, and they knew the published inorganic nomenclature rules and IUPAC rules intimately. IUPAC reference books are continually revised but subsequent editions retain the cover color of the first version, so organic nomenclature is always found in the *Blue Book*, and inorganic in the *Red Book*, whatever the editions, and so on. The first version of the inorganic rules (*Report of the Committee for the Reform of Inorganic Chemical Nomenclature*) was actually written in German and had been completed just before the Second World War. An English translation was published in 1940. The first *Red Book* version was published in 1957 and had parallel texts in English and French. For most of the members of CNIC at that time, that publication was regarded as finished, but regular meetings of IUPAC still provided a good opportunity to see old friends, argue about angels and points of needles, and to gain prestige at home, if any of your colleagues actually knew what IUPAC was supposed to be. The agenda of a meeting was drawn up at the beginning of the first day, and was worked through solidly. However, it was always necessary to reach the conclusion that the chairman wanted, and on many occasions we worked from nine till nine, when the exhausted and hungry members of the commission finally capitulated. After dinner, however late, the secretary had to write the minutes for approval the following morning! When the CNIC meeting coincided with the General Assembly, the chairman would suddenly announce that he had to go to another meeting, and depart with a throw-away line such as: "It's up to you to decide this matter without me." In truth, it never was, unless the decision was what the chairman actually wanted.

CNOC worked rather similarly, but we did try to hold joint meetings of CNIC and CNOC, because overlaps of nomenclature were becoming evident, with the development of areas such as organometallic chemistry. These meetings were often a dialogue of the deaf. Both commissions knew how to name the compounds that fell within what they regarded as their aegis, and no quarter was asked or given. CNOC also had the benefit of a long established and widely accepted methodology, whereas CNIC were relative ingénues. So we ran along parallel lines, due to meet only at infinity, and few of us were likely to survive long enough to see that happy event. Evidently things had to change, and with the proper application of rules concerning

terms of membership, things eventually did. Newer and younger people arrived in CNIC and proper programs of work were established by the 1980s. The next version of the *Red Book* was published in 1990.

Many of the difficulties described here have now faded away. Both CNIC and CNOC have been abolished. The Chemical Nomenclature and Structure Representation Division (Division VIII) is formally responsible for what they once did. This is clearly sensible, because nomenclature is now treated as a single subject. However, I remain to be convinced that the current project system will suffice to deal with long-term activities such as regular revision of the *Red* and *Blue Books*. There are relatively few nomenclaturists of either stripe on the division committee, and many nomenclature activities require large groups of workers. The projects may have to be very flexible to accommodate them. Indeed, recommended atomic weights are revised by what seems to me to be a permanent commission under another name, and quite justifiably so.

In nomenclature, some new activities are proceeding under the aegis of Division VIII. There is a project to identify *Preferred IUPAC Names*, or PINs, which will be the names used in legal documents. Currently, IUPAC nomenclature procedures can lead to more than one name for a given compound, which can be confusing. New IUPAC documents will carry the PINs of the compounds they describe. Since IUPAC cannot impose its suggestions on the chemistry community, and because chemists will continue to read the older literature with its multiplicity of names, IUPAC will continue to cite these other names alongside the PINs.

Many systematic names are very long and difficult to construct accurately for any but a skilled nomenclaturist. A particularly innovative development has been to construct a language that can enable a computer to draw a chemical structure by having it read what, to the eye, is simply a meaningless string of alphanumeric symbols, or to construct such a string when it is presented with a structure written in a particular manner. Such a string is termed an International Chemical Identifier, or *InChI* (pronounced "inchee"). An InChI is unique to any given compound and provides an unequivocal method for describing its structure.

There seems to me to be two major internal problems for IUPAC to solve in order for the organization to remain in good health. It is vital to attract newer and younger people to take part in IUPAC's activities, and not just senior persons who have reached a certain degree of eminence in their home organizations. However, motivations such as my own original stimulus are no longer enough, because the activities of IUPAC, however vital, do not carry enough prestige to persuade a person embarking on an academic career to spend time on activities that do not result in research publications. We need more input from National Adhering Organizations (NAOs) and more prestige to attach to IUPAC activities. There are currently 51 NAOs, each paying a subscription based upon the annual turnover of its chemical industry. This money is used to run the Union. The individual members of IUPAC, now as in the 1960s, are usually nominated by their own NAOs, and are volunteers whose time devoted to IUPAC work is limited by their other professional responsibilities. We need the NAOs to publicize IUPAC's work and to try to ensure that such work is recognized by national authorities as useful and valuable.

CNIC meeting in 1978 (from left): F. Bertello (Argentina), C.K. Buschbeck (Federal Republic of Germany), D.M.P. Mingos (UK), B.F. Myasoedov (USSR), Y. Jeannin (France), W.H. Powell (USA), J. Chatt (UK), K. Yamasaki (Japan), and G.J. Leigh (UK).

The other problem is to ensure that there is a steady supply of projects that are of value and use to the community. Many of the current projects stem from older persons and older programs, but a stream of suggestions arising from outside the Union would be invaluable. A campaign by individual NAOs amongst their own members might be one way to approach

this. At the least it would publicize IUPAC activities in the community at large.

IUPAC Reference Publications

The most important IUPAC reference publications are listed below.

- *Compendium of Analytical Nomenclature* (definitive rules 1997), 3rd edition, 1998, known as the IUPAC Orange Book.
- *Quantities, Units and Symbols in Physical Chemistry*, 3rd edition, 2007, known as the IUPAC *Green Book*.
- *Combining and Reporting Analytical Results*, 2006.
- *Compendium of Chemical Terminology*, 2006, known as the IUPAC *Gold Book*.
- *Nomenclature of Inorganic Chemistry*, IUPAC Recommendations 2005, known as the IUPAC *Red Book*.
- *Compendium of Terminology and Nomenclature of Properties in Clinical Laboratory Sciences*, 1995, known as the IUPAC *Silver Book*.
- *Multilingual Dictionary of Analytical Terms*, 1994.
- *The Nomenclature of Organic Chemistry*, 1993, known as the IUPAC *Blue Book* (a new edition is in preparation).
- *A Guide to IUPAC Nomenclature of Organic Compounds* (recommendations 1993), A Guide to the *Blue Book*, 1993.
- *Compendium of Macromolecular Nomenclature*, 1991, known as the IUPAC *Purple Book* (a new edition is in preparation).

For those whose principal interest is nomenclature, there are elementary guides available, suitable for teachers and students rather than for specialists. One of the most important is *Principles of Chemical Nomenclature: A Guide to IUPAC Recommendations*, 1998. The writer is currently leading a project to revise this text, and it is hoped that a newer version will appear before the end of 2009.

Jeffery Leigh <jeffery.leigh@sky.com> is a member of the Chemical Nomenclature and Structure Representation Division (IUPAC Division VIII). He is an emeritus professor of Environmental Science at the University of Sussex.

Stamps International

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

Libby and the Nuclear Hourglass

Radiocarbon dating is one of the most important radiometric methods available to estimate the age of carbon-containing materials up to 60 000 years old, and has thus found multiple applications in archeology, geology, and other branches of science. It is based on the use of the naturally occurring carbon-14 radioisotope, which is continuously generated in the stratosphere and upper layers of the troposphere when cosmic rays interact with atomic nitrogen. This nuclide is quickly oxidized to carbon dioxide and enters the global carbon cycle, where it slowly begins its unrelenting beta decay to nitrogen-14 with a half-life of about 5 730 years.

The stamp illustrated in this note was issued by Monaco in 2004 to honor Willard Frank Libby (1908–1980), the American chemist who developed the technique of radiocarbon dating in the late 1940s while working at the University of Chicago. He subsequently received the 1960 Nobel Prize in Chemistry for this discovery. In addition to Libby's likeness, the stamp shows an hourglass, a clever choice since the radioactive decay of carbon-14 occurs at a regular and predictable rate, much like the flow of sand in an hourglass. Unfortunately, it is also worth noting that the stamp incorrectly gives Libby's first and middle names as Frank Willard (instead of Willard Frank), not the first time the wealthy city-state makes a blunder in the realm of chemical philately, as we shall see in a future note.

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

CHEMRAWN VII Prize for Atmospheric and Green Chemistry

The CHEMRAWN VII Future Actions Committee and the Organic and Biomolecular Chemistry Division have established the CHEMRAWN VII Prize for Atmospheric and Green Chemistry. The prize of USD 5000 will be awarded to a young scientist (under age 45) from a developing country who is contributing to the field of green chemistry through atmospheric chemistry research. The first award will be given at the IUPAC Conference on Green Chemistry in 2010. It will be awarded biennially at the same conference.

The award will be administered by the Organic and Biomolecular Chemistry Division. The Selection Committee will consist of the president of the division (who will serve as chair), the chair of the Subcommittee on Green Chemistry, and the chair of CHEMRAWN.

www.iupac.org/news/archives/2008/CRVII-prize.html

Inviting Young Chemists to the 42nd IUPAC Congress in Glasgow

To encourage young chemists to participate in the 42nd IUPAC Congress and 45th IUPAC General Assembly, the organizers have established two different Young Chemist Award programs, both offering travel assistance. The congress and GA will take place 2-7 August 2009 at the UK's Scottish Exhibition and Conference Center. The theme of the Congress is "Chemistry Solutions." The two award programs are as follows:

- Program A is especially targeted at young scientists from developing and economically disadvantaged countries.
- Program B is open to chemists from any country.

For each program, respectively, about 30 and 20 awards of between USD 750 and USD 1500 will be made available to successful candidates as a contribution to the cost of their travel to attend the Congress and to meet Congress registration fees.

Applications from candidates under age 40 are welcomed. Scientists from academia, government, or industry may submit applications directly to the address below. Successful applicants will be expected to submit an oral or poster presentation abstract to be presented at the Congress. Such abstracts will be subject to adjudication as will all other submissions for presentation at the meeting.

Applicants are asked to visit the IUPAC website to download the application form, and complete it with the following information:

- confirmation of their current position/employment status and affiliation
- whether they are applying for Program A or B
- the title of their abstract submission to the IUPAC Congress
- a list of their 5–10 top publications
- an estimate of the applicant's economy airfares to and from the Congress

In addition to the form, applicants will be asked to return a brief CV (2 pages maximum) and a letter of support from the appropriate department head, dean, or laboratory supervisor.

Applicants are not required to be a member or affiliate of IUPAC or the RSC to be eligible for a Young Chemist Award. Please note however that successful applicants will not be eligible to apply separately for an RSC bursary to attend the Congress.

The deadline for receipt of applications is 16 January 2009, which coincides with the IUPAC Congress call for abstracts deadline. Applications should be sent to:

RSC Conferences (IUPAC Young Chemist Award)
Thomas Graham House
Science Park, Milton Road
Cambridge, CB4 0WF UK

Alternatively, you can e-mail applications as attachments to RSC Conferences at <iupac2009@rsc.org> with "IUPAC Young Chemist Award application" in the subject line.

www.iupac.org/news/archives/2008/42ndCongress-yc.html

XML Gold Book—2.0 release

IUPAC announces the release of a new version of the online *Gold Book* <goldbook.iupac.org>. It contains more than 300 new terms, improved rendering of mathematical formulas, new and better server-side search, and improvements in both content and code. DOIs have been registered for all the terms in the *Gold Book* providing durable links that can be used in documents that reference terms in the *Gold Book*. In addition, and to allow for structure search, InChI and InChIkey have been added in the metadata of all chemical structures appearing in the *Gold Book* (International Chemical Identifier <www.iupac.org/inchi>).

The *Gold Book*, more formally the *IUPAC Compendium of Chemical Terminology*, is a compendium of definitions recommended by IUPAC in many areas of the chemical sciences. The *Gold Book* contains only definitions approved by international consensus and thus can be regarded as truly authoritative.

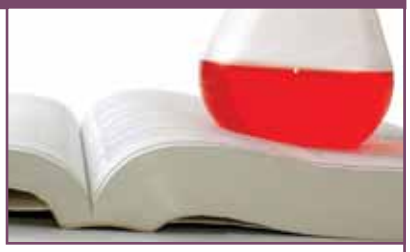
Please send any comments and suggestions regarding the functionality, usability, and content of the electronic version to Bedrich Kosata <Bedrich.Kosata@vscht.cz>.

www.iupac.org/news/archives/2008/goldbook20.html

The Project Place

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

Revision of the Silver Book



The revision of the *Silver Book*, the *Compendium of Terminology and Nomenclature of Properties in Clinical Laboratory Sciences*, is a joint project between IUPAC and the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC). The project will result in the publication of a hardcopy and online version of the *Silver Book*.

Since its original publication in 1995, many significant developments have occurred in the field of clinical laboratory sciences, and in metrological concepts, definitions, and terms. Several branches of the clinical sciences have expanded and some new disciplines have appeared, necessitating additional coverage in the *Silver Book*. These new sections will be based upon recommendations published by various national, regional, and international bodies. Particularly, recent publications of IUPAC, IFCC, standards of ISO and CEN, and of the *International Vocabulary of Metrology—Basic and General Concepts and Associated Terms*, 3rd edition, must be considered for the new version.

Another reason for revising the *Silver Book* is that the interrelationships between various disciplines (the traditional and the recently developed) applied in the clinical laboratory are more and more frequent and necessary, not only from a scientific point of view, but also in practice (i.e., for an accurate diagnosis or prognosis). This evolution needs a common structure and language for data transfer to ensure an accurate exchange of information between the laboratory professional and the clinician.

Another key purpose of the revised *Silver Book* is to illustrate the list of the properties with examples taken from the IUPAC/IFCC Nomenclature, Properties, and Units database. Conversely, the principles of an updated *Silver Book* will be useful for the future development of the database. The structure and proposed contents of the book are presented on the project webpage available at the address below.

The project task group consists of experts from Canada, Denmark, France, Japan, Spain, and the USA.

For more information and comments, contact Georges Férard <georges.ferard@noos.fr>.

www.iupac.org/web/ins/2007-033-3-700

A Glossary of Concepts and Terms in Chemometrics

Chemometrics has been defined (by the International Chemometrics Society) as *"the science of relating measurements made on a chemical system or process to the state of the system via application of mathematical or statistical methods."* With the advent of analytical instrumentation that provides many data during the course of a measurement, and increased computing power to deal with those data, chemometrics has become a recognized subdiscipline within chemistry.

Those in this growing discipline come from the fields of statistics and mathematics through to spectroscopy, process control, environmental chemistry, and clinical chemistry. There are many text books, university courses, and two journals dedicated to the subject. However, due its fast growth, the terminology for chemometrics has been coined in an ad hoc way, even resulting in the swapping of some terms for concepts (e.g., "scores" and "loadings"). The sector is also fiercely independent and any attempt to codify terminology can only be accomplished with the participation of all players.

This project proposes to approach the problem via a public wiki site, following the lead of Kermit Murray's project on mass spectrometry. Using previous compilations as a starting point, the task group will post suggested definitions, and allow the community to comment and change (not indelibly). At the end of the consultation period, the task group will try to compile the results and publish IUPAC recommendations.

This project is a scoping exercise to determine if the "wiki" approach is likely to succeed, and to determine how the glossary can be cross referenced. Later projects will concentrate on finalizing the glossary, and perhaps writing a chapter of the *Orange Book*.

The first task group meeting took place during the CAC2008 conference in Montpellier, France (2 July 2008). The task group chair addressed a plenary session of the conference to announce and publicize the project. The second and final face-to-face meeting will be at the General Assembly in Glasgow in 2009.

For more information and comments, contact Brynn Hibbert <b.hibbert@unsw.edu.au>.

www.iupac.org/web/ins/2008-002-1-500

Options for IUPAC Engagement in SAICM Implementation

How can IUPAC support SAICM* implementation? This question was the topic of discussion during various meetings that the Committee on Chemistry and Industry (COCI) coordinated between IUPAC and SAICM, the U.N. Environment Programme (UNEP), and the World Health Organization (WHO) in June 2008.

At the World Chemistry Leadership Meeting in Torino in August 2007,[1] IUPAC was invited by UNEP to help strengthen the bridge between science and policy as SAICM moves into the implementation phase. The publication of the WCLM report and follow-up with the UN agencies has led to a formal request for IUPAC to meet with them to discuss how IUPAC might interact with SAICM in the context of the current planning for the second session of the International Conference on Chemicals Management in 2009. This consultation activity complements IUPAC's interest in the public appreciation of chemistry, including planning for the International Year of Chemistry, and its efforts to seek formal UN recognition to engage more effectively on industry relevant issues.

On 19 June 2008, the IUPAC project team,[2] consisting of Mark Cesa, Colin Humphris, John Duffus, and Stanley Langer, met in a succession of meetings with representatives of SAICM, UNEP, and WHO:

- Lesley Onyon and Matthew Gubb, SAICM
- Kaj Madsen, senior program officer, and Heidelore Fiedler, scientific affairs officer, UNEP Chemicals Branch, Division of Technology, Industry, and Economics
- Tim Meredith, Coordinator of the International Program on Chemical Safety, WHO

The task group reported that this proved a highly illuminating and valuable series of meetings, particularly in relation to the current IUPAC interest in broader engagement with the UN and the promotion of chemistry as highly relevant to world needs and sustainable development. SAICM can provide an opportunity to extend the impact of existing IUPAC chemistry information, educational materials, and activities on capacity building. It also provides the opportunity for financial support for specific projects IUPAC might propose in support of SAICM. IUPAC's project structure is ideal to ensure selective and focused engagement in SAICM.

*What is SAICM?

The Strategic Approach to International Chemicals Management (SAICM) is an initiative in international cooperation to protect human health and the environment. It was adopted in Dubai on 6 February 2006 at the International Conference on Chemicals Management following a consultative process involving representatives of governments, intergovernmental organizations, and civil society (industry, NGOs, trade unions). SAICM provides a policy framework to guide efforts to achieve the Johannesburg Plan (2002) that by 2020 chemicals will be produced and used in ways that minimize significant adverse impacts on the environment and on human health. SAICM acknowledges the essential contribution made by chemicals to modern societies and economies.

In effect, SAICM will act as an umbrella for a number of chemical conventions, including Rotterdam, Stockholm, Basle, and chemical weapons. The overarching strategy is available in six languages at: www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm.

SAICM is managed by an interagency secretariat co-hosted by UNEP and WHO that is based in Geneva. The secretariat is responsible for supporting the institutional arrangements to implement SAICM, which include coordination of national and regional actions and the organization of periodic (three yearly) reviews of the progress of implementation. The secretariat regards the scientific community as a key stakeholder in the process, one that they are keen to engage fully. Read more about the role of ICCA in the May-June 2007 *CI* <www.iupac.org/publications/ci/2007/2903/2_dumitrescu.html>.

The Project Place

The task group made a series of recommendations to IUPAC executives, with the main goals of engaging more fully with SAICM and in particular encouraging IUPAC to take part in the next SAICM implementation conference (ICCM2) in May 2009. Following are the recommendations:

- IUPAC should establish a formal link and science clearing house to enable SAICM stakeholders easy access to IUPAC information and educational materials.
- IUPAC divisions and standing committees should be encouraged to review their project strategies in light of the science support needs of SAICM and with a view to seek financial support from SAICM. For example, COCI will work with SAICM to obtain funding to extend the current Safety Training Program.

Mark Cesa participated in the SAICM technical and legal planning meeting in Rome in October 2008 to ensure IUPAC's views were taken into account.

References

1. WCLM 2007 proceedings: www.iupac.org/publications/ci/2008/3001/3_humphris.html
2. Mark Cesa is chair of the Committee on Chemistry and Industry, Colin Humphris is project leader and a titular member of COCI, John Duffus is a titular member of the IUPAC Division of Chemistry and Human Health, and Stanley Langer is secretary of CHEMRAWN.

A long version of this report is accessible from the project web page at the address below. For more information/comments contact Colin Humphris <cjhumphris@btinternet.com>.

www.iupac.org/web/ins/2008-012-1-022

Provisional Recommendations

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

www.iupac.org/reports/provisional

Thermochemistry of Chemical Reactions: I. Terminology and Symbols

This work, which is presented in two parts, is concerned with the most currently experimental techniques used on the study of the thermochemistry of chemical reactions. The first part of this recommendation deals with the terminology and symbols, discusses the meaning, designation and symbols of the different parameters used in molecular thermodynamic studies. Part II entitled "Experimental Methods for the Determination of Bond Energies," is to be published as a separate technical report.

Comments by 31 December 2008
Prof. Manuel A. V. Ribeiro da Silva
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Glossary of Terms Used in Ecotoxicology

The objective of the *Glossary of Terms Used in Ecotoxicology* is to give clear definitions for those who contribute to studies relevant to ecotoxicology but are not themselves ecotoxicologists. This applies especially to chemists who need to understand the ecotoxicological literature without recourse to a multiplicity of dictionaries. The glossary includes terms related to chemical speciation in the environment, sampling, monitoring and environmental analysis, as well as to adverse ecological effects of chemicals, ecological biomarkers, and the environmental distribution of chemicals. The dictionary consists of about 993 terms.

Comments by 31 December 2008
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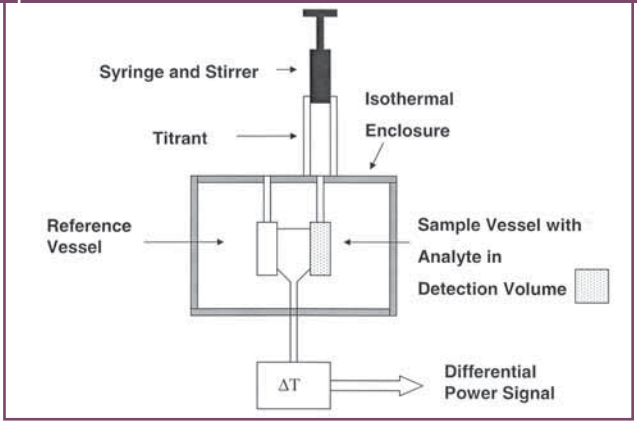
Recommendations on Measurement and Analysis of Results Obtained on Biological Substances Using Isothermal Titration Calorimetry (IUPAC Technical Report)

Frederick P. Schwarz, Timm Reinisch, Hans-Jürgen Hinz, and Avadhesha Surolia

Pure and Applied Chemistry, 2008
Vol. 80, No. 9, pp. 2025–2040
doi:10.1351/pac200880092025



Basic ITC instrument, consisting of a sample vessel containing the analyte solution and a vessel containing a reference solution (e.g., buffer solution) within an isothermal enclosure.

Isothermal titration calorimetry (ITC) is widely used to determine the thermodynamics of biological interactions, including protein-protein, small molecule-protein, protein-DNA, small molecule-DNA, and antigen–antibody interactions. An ITC measurement consists of monitoring the transfer of heat between an analyte solution in a sample vessel and a reference solution in a reference vessel upon injection of a small aliquot of titrant solution into the sample vessel at a fixed ITC operating temperature. A binding isotherm is generated from the heat-transferred-per-injection data. Values for the binding constants, the apparent binding enthalpies, and the apparent ratio of the amount of titrant to analyte for the binding reaction are then determined from fits of a binding model (whether it is a single site, identical multi-site, or an interacting multi-site binding model) to the binding isotherm.

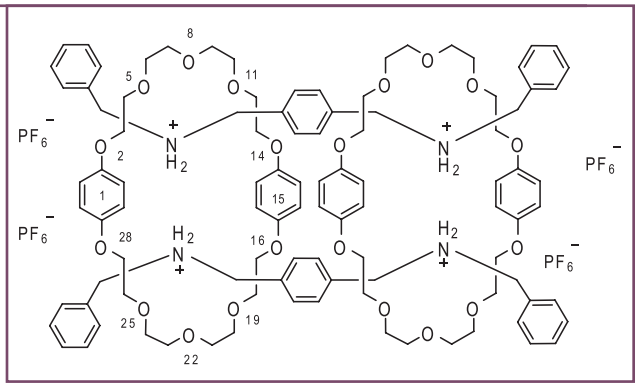
Prior to the fitting procedure, corrections should be made for contributions from extraneous heat of mixing determined separately from injections of the titrant into just the dialysate/buffer solution. Ultra-high binding constants, which cannot be directly determined from an ITC measurement, can be determined by a displacement ITC method where injections of the tight-binding titrant into a solution of a weaker-binding titrant-analyte complex displaces the weaker-binding titrant from the complex. The Michaelis and catalytic constants can be determined for an enzyme reaction from injections of a substrate or enzyme titrant into an enzyme or substrate analyte solution. This article suggests several binding reactions to use to check the operating performance of the ITC. The reporting of ITC results must be specific with regard to the composition of the titrant and the analyte solutions, the temperature, and the model used in the analysis.

www.iupac.org/publications/pac/80/9/2025/

Nomenclature for Rotaxanes and Pseudorotaxanes (IUPAC Recommendations 2008)

Andrey Yerin, Edward S. Wilks, Gerard P. Moss, and Akira Harada

Pure and Applied Chemistry, 2008
Vol. 80, No. 9, pp. 2041–2068
doi:10.1351/pac200880092041



A Type 2.2 [4]pseudorotaxane with symmetrical components: **[4]{[2][1,1′-(1,4-phenylene)bis(*N*-benzylmethanaminium)]-rotaxa-[2][2,5,8,11,14,16,19,22,25,28-decaoxa-1,15(1,4)dibenzenacyclooctacosaphane]} tetrakis (hexafluoridophosphate).**

Rotaxanes were first represented pictorially in 1958 as in situ intermediates in the synthesis of [2]catenanes. Rotaxanes were proposed as a new type of species (though not referred to as pseudorotaxanes or rotaxanes) in 1961, and shown to exist in 1967. However, it was not until 1971 that Schill introduced a nomen-

clature system for rotaxanes. In 2000, Vögtle and coworkers proposed a generic nomenclature system in which Schill's description was extended to include information about mechanical or covalent linkages within the components of the rotaxane to distinguish between intermolecular and intramolecular rotaxanes. Nevertheless, the proposed nomenclature cannot unambiguously describe the whole range of rotaxane structures reported in the literature.

This article specifies a systematic nomenclature for rotaxanes that includes the description of structure, composition, and isomerism of rotaxanes. This article discusses only rotaxanes in which none of the components is macromolecular, but the naming principles specified also can be used to name macromolecular rotaxanes. Specific recommendations for naming rotaxanes with at least one polymeric component will be published in a separate document.

Because the structures of rotaxanes are often large, in most cases throughout this article schematic presentations of rotaxanes and their components are used. Full chemical structures of rotaxanes and their systematic names are given.

www.iupac.org/publications/pac/80/9/2041

Solubility Data Series

SDS Volume 83: Acetonitrile: Ternary and Quaternary Systems

V.P. Sazonov, et. al.

J. Phys. Chem. Ref. Data, 2007, Vol. 36, No. 3
pp. 733–1131; doi: 10.1063/1.2539811

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

SDS Volume 84: Solubility of Inorganic Actinide Compounds

Jiri Hála and H. Miyamoto

J. Phys. Chem. Ref. Data, 2007, Vol. 36, No. 4
pp. 1417-1736; doi: 10.1063/1.2741386

This volume presents the solubility of inorganic compounds of actinides except for carbonates, which are included in Volume 74 of this series, and nitrates, which are covered in Volume 55. Also included are solubility data of compounds such as organosulfates, phosphates, and arsenates, which are not covered in Volume 74. The predominant part of this volume covers solubility data of thorium, uranium, neptunium, and plutonium compounds. Fewer data have been published for americium compounds and very few for compounds of actinium, protactinium, and transamericium elements. The literature has been covered up to the end of 2004. Documents that remained unavailable to the editor, and could not be included in the volume are listed in the appendix. For some compounds, it was not possible to show the Chemical Abstracts registry numbers since these have not been assigned.

Self-Healing Materials: An Alternative Approach to 20 Centuries of Materials Science

Springer Series in Materials Science, Vol. 100, 2007
Zwaag, Sybrand van der (Ed.)
ISBN: 978-1-4020-6249-0

As a result of the pathbreaking First International Conference on Self-Healing Materials, a distinguished group of experts was invited to contribute a chapter to the textbook *Self-Healing Materials: An Alternative Approach to 20 Centuries of Materials Science*, published by Springer. This book, the first in this new field of materials science, aims to present a coherent picture of design principles and resulting properties of self-healing materials over all material classes, and to offset them to the current design principles for structural materials with improved mechanical properties.

The First International Conference on Self Healing Materials <www.selfhealingmaterials.nl>, organized by the Delft Centre for Materials and sponsored by IUPAC, was held 18 to 20 April 2007 in Noordwijk aan Zee, the Netherlands. The event featured over 80 speakers from 5 continents and was attended by more than 200 participants. Chairmen of the conference were S. White (University of Illinois, USA) and S. van der Zwaag (Delft University of Technology).

The **Second International Conference on Self-Healing Materials** will be held 28 June to 1 July 2009 at The Westin Chicago River North in downtown Chicago, Illinois, USA. Building on the success of the first conference, an even larger turnout is expected. The site is a four-star hotel along the Chicago River within walking distance of the Magnificent Mile shopping district, Navy Pier, Millennium Park and other Chicago sites.

More information is available concerning registration, abstract submission, hotel accommodations, tours, and additional conference details. Scott White and Ian Bond are the conference co-chairs.

http://conferences.beckman.uiuc.edu/ICSHM2009

Although the phenomenon of self-healing has been recognized in materials throughout history, especially with regards to biological systems, it was only recently that the property of self-healing was seriously considered as a desirable function for man-made materials. Beginning with the first successful incorporation of self-healing functionality in an (man-made) epoxy-system via micro encapsulation at the University of Illinois, research groups throughout the world have started to explore concepts and materials systems that impart self-healing properties for a variety of applications.

The conference was organized to gather and benefit from the insights gathered thus far in this intriguing new field. The expansive scope of the field is reflected in the topics represented at the conference:

- asphaltic materials
- bio-inspired technical materials
- cementitious materials
- composites and hybrids
- metals
- paints and other coatings
- structural polymers
- biological systems
- theoretical models related to self-healing
- characterization of self-healing behavior

An exciting opening lecture on the "Future of Autonomic Materials Systems" by Scott White, University of Illinois at Urbana-Champaign, introduced new ideas about how autonomic materials systems will provide self-sensing, regrowth, and other biologically inspired functions.

Peter Fratzl, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany, reported about "Self-Repair in Bone Tissue, Plasticity, Remodelling, Healing." He explained the fundamental differences between the design of natural materials and engineered materials. Nature adapts constantly to changing conditions during its whole life time. Explaining the self-repair of bones as a typical example occurring in nature, prin-

ciples and strategies can be understood and adapted to engineering material systems.

Other lecture subjects included "Particle-Filled Microcapsules to Repair Damaged Substrates" by Anna Balazs, "Self-Healing Fibre Reinforced Polymer Composites" by Ian Bond, "Self-Healing in Concrete Materials" by Victor Li, "Self-Healing of Thermosetting Resins" by F. Jones, "Self-Healing in Metals" by R. Lumley and H. Wang, and "Mechanisms of Healing in Asphalt Mixtures" by D. Little.

www.springer.com/chemistry/polymer/book/978-1-4020-6249-0

Group photo taken at the First International Conference on Self Healing Materials in the Netherlands.

International Vocabulary of Metrology—Basic and General Concepts and Associated Terms

3rd edition, JCGM (Joint Committee for Guides in Metrology) 200:2008

In general, a vocabulary is a "terminological dictionary which contains designations and definitions from one or more specific subject fields" (ISO 1087-1:2000, 3.7.2). The vocabulary in this book pertains to metrology, the "science of measurement and its application." It also covers the basic principles governing quantities and units. The field of quantities and units could be treated in many different ways. Clause 1 of this vocabulary is one such treatment, and is based on the principles laid down in the various parts of ISO 31, *Quantities and Units*, currently being replaced by the ISO 80000 and IEC 80000 series *Quantities and Units*, and in the SI brochure, *The International System of Units* (published by the Bureau International des Poids et Mesures, BIPM).

The second edition of the *International Vocabulary of Basic and General Terms in Metrology* (VIM) was published in 1993. A third edition was published in order to cover measurements in chemistry and laboratory medicine for the first time, as well as to incorporate concepts related to metrological traceability, measurement uncertainty, and nominal properties. Its title is now *International Vocabulary of Metrology—Basic and General Concepts and Associated Terms* (VIM) in order to emphasize the primary role of concepts in developing a vocabulary.

In this vocabulary, it is taken for granted that there is no fundamental difference among the basic principles of measurement in physics, chemistry, laboratory medicine, biology, or engineering. Furthermore, an attempt has been made to meet conceptual needs of measurement in fields such as biochemistry, food science, forensic science, and molecular biology.

Several concepts that appeared in the second edition of the VIM do not appear in this third edition because they are no longer considered to be basic or general. For example, the concept "response time," used in describing the temporal behavior of a measuring system, is not included. For concepts related to measurement devices that are not covered by this third edition of the VIM, the reader should consult other vocabularies such as IEC 60050, *International Electrotechnical Vocabulary*. For concepts concerned with quality management, mutual recognition arrangements pertaining to metrology, or legal metrology, the reader is referred to documents given in the bibliography.

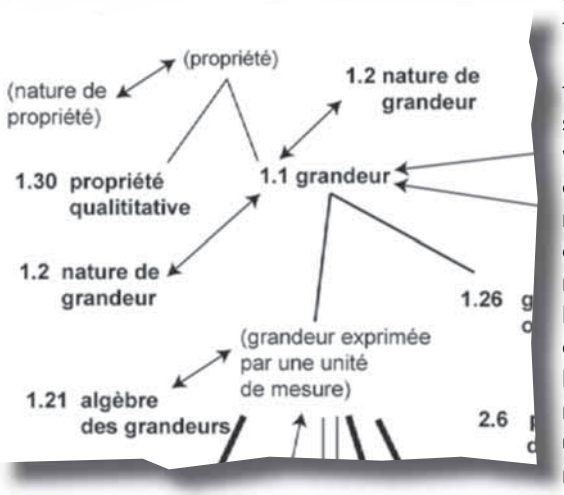
Development of this third edition of the VIM has raised some fundamental questions about different current philosophies and descriptions of measurement, as will be summarized below. These differences sometimes lead to difficulties in developing definitions that could be used across the different descriptions. No preference is given in this third edition to any of the particular approaches.

The change in the treatment of measurement uncertainty from an Error Approach (sometimes called Traditional Approach or True Value Approach) to an Uncertainty Approach necessitated reconsideration

of some of the related concepts appearing in the second edition of the VIM. The objective of measurement in the Error Approach is to determine an estimate of the true value that is as close as possible to that single true value. The deviation from the true value is composed of random and systematic errors. The two kinds of errors, assumed to be always distinguishable, have to be treated differently. No rule can be derived on how they combine to form the total error of any given measurement result, usually taken as the estimate. Usually, only an upper limit of the absolute value of the total error is estimated, sometimes loosely named "uncertainty."

In the CIPM Recommendation INC-1 (1980) on the Statement of Uncertainties, it is suggested that the components of measurement uncertainty should be grouped into two categories, Type A and Type B, according to whether they were evaluated by statistical methods or otherwise, and that they be combined to yield a variance according to the rules of mathematical probability theory by also treating the Type B components in terms of variances. The resulting standard deviation is an expression of a measurement uncertainty. A view of the Uncertainty Approach was detailed in the *Guide to the Expression of Uncertainty in Measurement* (GUM) (1993, corrected and reprinted in 1995) that focused on the mathematical treatment of measurement uncertainty through an explicit measurement model under the assumption that the measurand can be characterized by an essentially unique value. Moreover, in the GUM as well as in IEC documents, guidance is provided on the Uncertainty Approach in the case of a single reading of a calibrated instrument, a situation normally met in industrial metrology.

The objective of measurement in the Uncertainty Approach is not to determine a true value as closely as possible. Rather, it is assumed that the information from measurement only permits assignment of an interval of reasonable values to the measurand, based on the assumption that no mistakes have been made in performing the measurement. Additional relevant information may reduce the range of the interval of values that can reasonably be attributed to the measurand. However, even the most refined measurement cannot reduce the interval to a single value because of the finite amount of detail in the definition of a measurand. The definitional uncertainty, therefore, sets a minimum limit to any measurement uncertainty. The interval can be represented by one of its values, called a "measured quantity value."



Part of a diagram from the International Vocabulary of Basic and General Terms in Metrology.

In the GUM, the definitional uncertainty is considered to be negligible with respect to the other components of measurement uncertainty. The objective of measurement is then to establish a probability that this essentially unique value lies within an interval of measured quantity values, based on the information available from measurement.

The IEC scenario focuses on measurements with single readings, permitting the investigation of whether quantities vary in time by demonstrating whether measurement results are compatible. The IEC view also allows non-negligible definitional uncertainties. The validity of the measurement results is highly dependent on the metrological properties of the instrument as demonstrated by its calibration. The interval of values offered to describe the measurand is the interval of values of measurement standards that would have given the same indications.

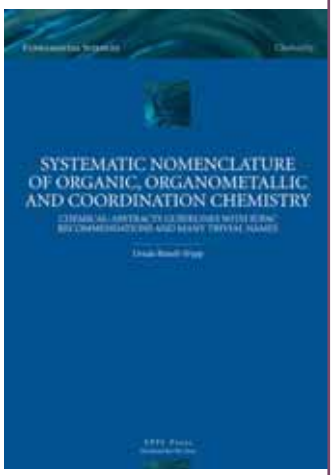
In the GUM, the concept of true value is kept for describing the objective of measurement, but the adjective "true" is considered to be redundant. The IEC does not use the concept to describe this objective. In this vocabulary, the concept and term are retained because of common usage and the importance of the concept.

See earlier announcement about the availability of the VIM in the Sep-Oct 2008 issue of *CI*, page 18. This 3rd edition is also published on paper by ISO (ISO/IEC Guide 99-12:2007, *International Vocabulary of Metrology-Basic and General Concepts and Associated Terms*, details are available at <www.iso.org>).

The full text of the VIM is available for free online at <www.bipm.org/en/publications/guides/vim.html>.

Systematic Nomenclature of Organic, Organometallic and Coordination Chemistry

Ursula Bünzli-Trepp
EPFL Press: Lausanne, Switzerland (distributed by CRC Press), 2007
ISBN: 978-2-940222-13-1



For the first time, chemists, biochemists, pharmacologists, scientists, editors, and software developers can rely on a user-friendly book containing everything required for constructing or interpreting systematic names of organic, organometallic, or coordination compounds, and more complicated molecules. The book covers naming procedures (based on the Chemical-Abstracts nomenclature guidelines), IUPAC recommendations, and many trivial names. Specifically, the book include the following:

- detailed descriptions of the names of molecular-skeleton parents, including an illustrative procedure for the naming of fused polycycles
- construction of the names of all compound classes illustrated by colors, with an emphasis on radicals, ions, and organometallic and coordination compounds
- collection of the stereoparent names of the alkaloids, amino acids, peptides, carbohydrates, cylitols, nucleosides, nucleotides, nucleic acids, steroids, terpenes, carotenoides, retinoids, vitamins, and porphyrins, as well as guidelines for the naming of polymers and isotopically modified compounds
- for the first time, detailed instructions for the citation of indicated H atom (indicated hydrogen) in names
- comprehensive description of the Cahn-Ingold-Prelog system for the specification of configuration and of the thus derived stereodescriptors for names of chiral organic, organometallic, and coordination compounds, including instructions concerning the stereodescriptors used by Chemical Abstracts until 1999
- over 6 000 drawings of compounds with names from practice, about 2 700 in color

www.epflpress.com/livres/EPFL978-2-940222-13-1.html

Mycotoxins and Phycotoxins: Proceedings of the XIIth International IUPAC Symposium

Food Additives and Contaminants
Volume 25, Issue 2, February 2008
Guest Editors: Hamide Z. Senyuva & Hans P. van Egmond

The proceedings of the XIIth IUPAC Symposium on Mycotoxins and Phycotoxins have now been published in *Food Additives and Contaminants* and in the *World Mycotoxin Journal*. This symposium, which was held in Istanbul from 21–25 May 2007, was part of an ongoing series of symposia, initiated by IUPAC in 1972. In Istanbul the attendance record was established, with more than 580 attendees representing 65 countries.

The symposium was organized by TÜBITAK-Ankara Test and Analysis Laboratory, with the support of an international team of leading scientists in the area of mycotoxins and phycotoxins. The scientific program of the symposium comprised 12 main sessions with presentations from 27 invited speakers who are well known worldwide and have renowned expertise in their fields. There were 105 oral presentations and 300 poster presentations selected by the symposium's Scientific Committee, an exhibition of analytical instruments, and displays from food manufacturers. Moreover, workshops, satellite meetings, and parallel meetings hosted by international and European companies were held concurrently.

The IUPAC symposia have become the principal interdisciplinary meeting on mycotoxins and phycotoxins, facilitating an opportunity to gain an overview of research and development in analytical chemistry, risk assessment, effects on human health, and control and remediation strategies.

The keynote lectures by Timothy Phillips, "Reducing Human Exposure to Aflatoxins through Use of Clays," and Benjamín A. Suarez-Isla, "The Need for New Functional and Analytical Methods for Marine Biotoxins," set an excellent tone and provided inspira-

continued on page 29

The Chemistry of the 21st Century—State of the Art

by Mª Angeles Monge, Pilar Goya, and José Elguero

Seventy-five years ago, a historic 11-day meeting was held (9–20 August 1933) by IUPAC officials to prepare for the XI General Assembly and the IX IUPAC Congress, which would take place in Madrid from 5 to 11 April 1934. This preparatory meeting was held in the Magdalena Palace at the Universidad Internacional de verano de Santander, Spain. To commemorate the event, a meeting was held from 23 to 25 July 2008 at the same venue under the title: **75th Anniversary of the Chemistry International Meeting: The Chemistry of the 21st Century—State of the Art**. Solvay[1] sponsored the meeting in celebration of the 100th anniversary of its factory in Torrelavega, Spain. About 60 people attended the meeting including students and professors.

After the official opening ceremony by Salvador Ordoñez, rector of the Universidad Internacional Menéndez Pelayo (UIMP), there was a short introductory lecture by José Elguero on the historical circumstances surrounding the 1933 meeting and its participants–among them, three Nobel Prize winners. Next, IUPAC Vice President Nicole Moreau summarized IUPAC's role in a chemical world.

Avelino Corma gave a lecture on "Molecular Design of Catalysts: From Basic Research to Industrial Applications" in which he described his research on molecular sieves with pores of different sizes that are used as heterogeneous catalysts. He also spoke about supported gold catalysts. This allowed the audience to understand his new concepts about the molecular design of solid acid-base (both Lewis and Brønsted) and redox catalysts that have created new possibilities in the field of fine chemistry.

The first full day of the conference began with an opening lecture by Jean-Marie Lehn on "Perspectives in Chemistry: From Molecular to Supramolecular to Constitutional Dynamic Chemistry." As expected, his lecture was full of new points of view about where the frontier of chemistry is. The notion of *dynamers* (or dynamic polymers) was introduced and the great possibilities open to chemists was thoroughly explained. This was followed by a presentation by Luis Antonio Oro (University of Zaragoza) on "Chemistry, Environment, and Sustainable Development." An extremely clear

Participants in the 1933 meeting. From left to right. Seated: Fritz Haber (Nobel Prize 1918), Richard Willstätter (Nobel Prize 1915), Hans von Euler-Chelpin (Nobel Prize 1929), Einar Biilmann (IUPAC president), E. Cohen, Nicola Parravano, Camille Matignon, E. Hauser, and Fritz Fichter. First row: Mrs. Cohen, Mrs. Ribas, Mrs. Seidel, Mrs. del Campo, Mrs. Calvet, George Barger, Mrs. del Fesno, Jean Gérard (IUPAC secretary general), Paulo E. de Berrédo Carneiro. Second row: Fernando Calvet, Angel del Campo Cerdán, Augusto Pérez Vitoria, Enrique Moles, Carlos del Fresno, Antonio Madinaveitia, Ignacio Ribas, and Atherton Seidell.

exposition of the problems and the chemical solutions to these problems followed. Next, Immaculada Ortíz Uribe discussed the important topic of "Great Challenges of Chemical Engineering in the 21st Century: Water Quality." She described how industry can contribute to sustainable development, the technologies for transforming waste water into drinking water, and the research carried out in her department at the University of Cantabria.

The afternoon session comprised two lectures. The first, by Carmen Nájera, was entitled "Recoverable Catalysts for Asymmetric Synthesis." Her detailed talk summarized the abundant research carried out at the University of Alicante and stressed the importance of chiral drugs. The second lecture, by Martín Martínez Ripoll on "Macromolecules, Crystals, and X-Rays," was an enthusiastic defense of the extraordinary past and promising future of crystallography for the study of biomolecules.

On the final day of the conference, attendees heard from Ernesto Carmona on "Simple and Multiple Bonds between Metal Atoms: Some Recent Developments." For those who believe that the notion of bond is the most important in general chemistry, Carmona not only presented his outstanding discovery of Zn-Zn bonds, but also covered other related metal-metal bonds from the literature. Pilar Goya lectured on "The iatrochemistry of the 21st Century: Drug Design," covering historic and recent aspects of drug design including the results obtained at the Institute of Medicinal Chemistry. The closing lecture on "Carbon Nanotubes and Their Applications in Biotechnology" was delivered by Mª Teresa Martínez Fernández.

The meeting ended with a lively panel discussion among David StC. Black, Nazario Martín (president of the Spanish Royal Society of Chemistry), and Otilia Mó (general director of Programs and Transfer of Knowledge in the Spanish Ministry of Science and Innovation).

Participants in the 2008 meeting (L to R). Seated: IUPAC Secretary General David StC. Black, Avelino Corma, Angeles Monge, IUPAC Vice President Nicole J. Moreau, Jean-Marie Lehn (Nobel Prize 1987), and José Elguero. First row: Ernesto Carmona, Avelino Corma, Luis A. Oro, Pilar Goya, a student, Immaculada Ortíz Uribe, Mª Teresa Martínez Fernández, Vicente Fornés, and Miguel Yus.

Notes

1. It is worth remembering that Solvay also played an important role in the creation of the International Association of Chemical Societies (IACS) in 1911 that led to the creation of IUPAC.

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Polymers at the Frontiers of Science and Technology

by Christopher K. Ober

MACRO 2008—the 42nd World Polymer Congress— was held in Taipei from 29 June to 4 July 2008. The general theme of Polymers at the Frontiers of Science and Technology was well suited to the rapid developments taking place in the host country. This congress, chaired by Show-An Chen, was held at the excellent facilities of the Taipei International Convention Center in downtown Taipei, near the 101 Center, the world's tallest building. Almost 1 200 scientists (over half from the host country) from 41 countries participated in the conference and the total number of presentations, including posters was over 1 250. After the host country, the majority of attendees came from Japan and Korea. Unfortunately, not all countries in Asia with a large polymer science community were well represented.

There were 10 plenary speakers including Nobel Laureates Yuan T. Lee and Robert Grubbs, as well as Sheng-Hsien Lin, Craig Hawker, Klaus Müllen, Alexei Khokhlov, Timothy Lodge, Stephen Z.D. Cheng, Toyoki Kunitake, E.W. Meijer, and Michael Buback. All gave outstanding talks to a packed auditorium. The conference offered as many as 10 parallel sessions covering the key topics of polymer science.

The International Young Polymer Scientist Symposium was held for the first time. Organized by Chi-Yang Chao, Dennis Smith, Todd Emrick, and Fuyuhiko Kubota, this meeting was the result of cooperation between IUPAC and the Polymer and PMSE Divisions of the American Chemical Society. Some of the finest younger polymer scientists from around the world were invited to speak at this symposium. Support for the event came from the Samsung Fund and Toyobo.

Left to right: Rong-Ming Ho (NTHU), Jien-Lien Lin (ITRI), Wen-Chang Chen (NTU), Show-An Chen (NTHU), Christopher Ober (Cornell Univ.), Chih-Yang Chao (NTU), and An-Chung Su (NTHU).

Of special note at this conference were the presentation of three awards recognizing excellence by polymer chemists, two of them given for the first time. The DSM Performance Materials Award (in cooperation with IUPAC) was presented to Craig Hawker for his brilliant work in applying fundamental polymer chemistry to practical problems. The 50 000 Euro prize was combined with a plenary talk and a symposium including world renowned speakers (Sep-Oct 2008 *CI*, p. 17).

During the closing ceremonies, the *Polymer-International*-IUPAC Award for mid-career polymer scientists was presented to Zhenan Bao (see July-Aug 2008 *CI*, p. 19). She gave a short overview of her exciting work in organic electronics.

The Samsung-IUPAC Young Polymer Scientist Award was given to Eric Cloutet of the University of Bordeaux, France, for his outstanding efforts in polymer synthesis. Hong-Shik Ko, president of the Samsung-Total Co., participated in the award ceremony. Finally, the IUPAC poster prizes were awarded to Satoshi Akasaka (Kyoto University), Kyuhyun Im (Pohang University of Science and Technology), and Nicolas Nouvel (Cambridge University). The PST Poster Prizes were presented to Yung-Jin Weng (National Taiwan University), Gudrun Schmidt-Naake (TU Clausthal), and Kotato Koike (Keio University).

Chris Ober <cober@ccmr.cornell.edu> is a professor in the Materials Science and Engineering Department at Cornell University in Ithaca, New York. He is president of the IUPAC Polymer Division and a member of the subcommittees on polymer terminology, polymer education, and developing polymer materials.

Solid State Chemistry

by Milan Drábik, Peter Komadel, Tomáš Grygar

The IUPAC-sponsored **8th Conference on Solid State Chemistry (SSC 2008)** was focused on the branches of solid-state and materials chemistry. Held from 6 to 11 July 2008 in Bratislava, Slovak Republic, the event attracted not only scientists but the producers of new materials and technologies. The scientific program of SSC 2008 comprised seven sessions:

- Synthesis and Characterization of Materials
- Crystal, Electronic, and Magnetic Structure
- Electrochemistry and Molten Salts
- Chemistry of Glasses
- Novel Inorganic Materials and Nanomaterials
- Layered Compounds, Clathrates, and Intercalates
- Deposited Films and Surface Chemistry

SSC 2008 was the continuation of the former Conference on Solid State Chemistry, which was held biannually in the Czech and Slovak Republics. It was organized by the Institute of Inorganic Chemistry of the Slovak Academy of Sciences, the Faculty of Chemical and Food Technology of Slovak University of Technology, and the Faculty of Natural Sciences of Comenius University. The conference continues to provide a friendly atmosphere for the exchange of new results and ideas within and between the groups active in different areas of solid state and materials chemistry.

The conference, which took place at the Družba Conference Center of Comenius University, had over 200 participants from 29 countries, and featured 18 invited talks, 73 lectures, and 146 posters. The complete list of presentations is available at <www.ssc2008.sav.sk>. Following is a sampling of the invited talks and speakers:

- What Is "Materials Chemistry"? (P. Day, UK, the outcomes of the IUPAC project 2005-001-1-200 —Towards Defining Materials Chemistry)
- Multifunctionality and Switching in Magnetic Molecular Materials (E.M. Coronado, Spain)
- Electrochemistry of Refractory Metals in Molten Salts; Application for Creation of New and Functional Materials (S. Kuznetsov, Russia)
- Ion Transfer Across a Polarized Room Temperature Ionic Liquid Membrane (Z. Samec, Czech Republic)
- Highly Efficient Nanocrystalline Titania Films for Photocatalysis; Applications to Solar Energy Conversion Devices (P. Lianos, Greece)

The contributions to SSC 2008 will be published in three international journals. The authors of invited talks have been officially invited by the scientific editor of *Pure and Applied Chemistry* to submit manuscripts, with anticipated publication at the beginning of year 2009. In addition, lecturers will have the option of submitting manuscripts of research articles, communications, or reviews based upon lectures or posters to the *Central European Journal of Chemistry and Chemical Papers*.

The **9th Conference on Solid State Chemistry** will be held in mid-September 2010 in Prague, Czech Republic. A web page containing an online "expression of interest" form is already active: <www.ssc2010.cz>.

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Peter Komadel <Peter.Komadel@savba.sk>) is the head of the Department of Silicates, Institute of Inorganic Chemistry, Slovak Academy of Sciences, Bratislava, Slovak Republic. He is president of the Slovak Clay Group and was chairman of the organizing committee of SSC 2008.

Tomáš Grygar <grygar@iic.cas.cz> is head of the Analytical Laboratory at the Institute of Inorganic Chemistry, Academy of Sciences of Czech Republic. He is a member of the organizing committee of SSC 2010.

Carbohydrates

by Berit Smestad Paulsen

From 27 July to 1 August 2008, the University of Oslo, Norway, was the host of the **24th International Carbohydrate Symposium** (ICS 2008). The conference consisted of the two Whistler award lectures, nine plenary lectures, 20 invited lectures, 115 oral contributions, and 400 poster presentations. There were 605 attendees from 40 countries at the conference, including an impressive group of 140 Japanese scientists. Other countries represented were Argentina, Australia, Austria, Belgium, Brazil, Canada, P.R. China, Czech Republic, Denmark, Finland, France, Gambia, Germany, Hungary, India, Iceland, Iran, Ireland, Israel, Italy, Korea, South, Latvia, Mali, The Netherlands, New Zealand, Nigeria, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Taiwan, United Kingdom and United States. The participants ranged from well-know senior scientists to young Ph.D. students, making the symposium an important meeting place for the younger generation.

Whistler award winner Carolyn Bertozzi, USA.

The president of the International Carbohydrate Organization, Mario Pinto, began the conference with a memorial lecture dedicated to the important carbohydrate chemists and biologists who had passed away since the last meeting. Welcome speeches were then given by the chair of ICS 2008, Berit Smestad Paulsen, rector of the University of Oslo, Geir Ellingsrud, and Knut Fægri, dean of the Mathematical and Science Faculty. Hans Vliegenhart greeted the participants on behalf of IUPAC.

The International Carbohydrate Organization established in 1984 an award in honor of Professor Roy L. Whistler to recognize scientists "who have made contributions of excellence in carbohydrate chemistry and biochemistry and with promise of continuing significant contributions". This award is always presented

following the Opening Ceremony of the symposium. In 2008 the award was given to two outstanding scientists within the carbohydrate world: Carolyn Bertozzi and Yukishige Ito.

Bertozzi is the leader in applying organic chemistry in living systems, most specifically for the study of glycosylation. To this end she has designed elegant chemical methods to introduce labelled unnatural compounds into the cellular biosynthetic machinery, thereby allowing for a wide range of studies to monitor changes in glycosylation in tissues and cells. Her cell surface engineering makes an essential contribution to biomedicine with a broad impact at the chemistry to biology interface.

Whistler award winner Yukishige Ito, Japan.

Ito's contributions cover the chemical synthesis of glycoconjugates for biological investigations, including novel synthetic methods of development. He has made distinguished contributions in many areas; of exceptional note are methods developed for alpha sialoside and beta mannoside linkages and the synthesis of some enormously complex molecules. His fundamental synthetic work on all aspect of large N-glycans makes it possible to focus in a very systematic way on the processing and quality control of glycoproteins in the cell, thereby clarifying key enzymes and chaperones at the molecular level.

Bjørn Erik Christensen, NTNU, Trondheim, Norway, was in charge of the scientific program of the symposium, which covered most aspects of carbohydrate chemistry:

- synthesis
- analysis
- glycobiology, glycomedicine, glycomics
- therapeutics, new materials, and bionanotechnology
- polysaccharides—structure, functions, applications
- industrial applications of carbohydrates

The plenary and oral session presentations ranged from biosynthesis of new bioactive oligosaccharides to structural elucidation of polysaccharides from various sources to their bioactive functions in different cell systems. Analytical and bioassay methods for structure activity studies were also presented.

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Organic Synthesis

by Sung Ho Kang

The **17th International Conference on Organic Synthesis (ICOS 17)**, which was held in Daejeon, Korea, from 22–27 June 2008 at the newly opened Daejeon Convention Center, drew more than 1 000 participants, including 412 scientists from 32 countries. Considering the many thousands of practitioners of organic and organic-related chemical sciences in Korea, it was surprising that in its 30+ year history this conference had never been held on the Peninsula until this year. The citizens and chemical professionals of Korea, and of Daejeon, were grateful to finally host this extremely important professional meeting.

The organizers of ICOS-17 decided to hold the conference in Daejon because they felt its "Science Town" district would stimulate and encourage professionals and help motivate more young students in Korea and Asia to consider to the field of organic synthesis.

ICOS-17 offered expanded coverage of subjects from previous conferences with a different presentation format. The conference topics were grouped as follows:

1. Discovery of New Reagents and Reactions
2. Challenges and New Trends in Natural Products Synthesis

ICOS-17 organizers with conference co-chairs Eun Lee and Sunggak Kim. (from left) Hee-Seung Lee, Guncheol Kim, Hong-Seok Kim, Sung Ho Kang, Eun Lee, Sunggak Kim, Hyo-Won Lee, Hyun-Joon Ha, Han-Young Kang, Hee-Yoon Lee.

3. Prospects in Bioorganic Chemistry and Chemical Biology
4. Visions in Organic Materials Research
5. Events in Drug Discovery and Process Development

Dean Toste (Univ. of California, Berkeley, USA) presented his hour-long Thieme-IUPAC prize lecture entitled "Gold(I) Catalysis for Organic Synthesis: Development, Applications and Asymmetric Catalysis (Jul-Aug 2008 *CI*, p. 21)." The 51 other invited speakers (36 from academia, 13 from industry, and 2 from research institutes) delivered superb 40-minute lectures in one morning session and three parallel afternoon sessions. More than 50 percent of the 533 poster presentations were given by foreign participants in two non-parallel sessions.

The opening and closing ceremonies of the conference featured remarks from well-known chemists and non-chemists alike. The opening ceremony featured a welcome address by Eun Lee (conference co-chair) and addresses by Jung-Il Jin (president of IUPAC) and Young Kwan Kim (vice mayor of Daejeon Metropolitan City). During an enjoyable banquet that followed an impressive traditional Korean performance, a few important remarks of gratitude were made by Eun Lee, and of congratulation by David StC. Black (secretary general of IUPAC) and by Tohru Fukuyama (University of Tokyo). The formal conference closing occurred through a farewell address by Sunggak Kim (conference co-chair).

ICOS-17 staff with organizing committee chairman Prof. Sung Ho Kang. (back row from left) Tae Woo Kim, Le Duy Hieu, Wonchul Lee, Sungkyoung Kang, Hyoung Cheul Kim; (front row from left) Hyo Young Kwon, Sung Ho Kang, Sanghye Shin, Celindro C. Nelma, and Young Suk You.

Leiv Sydnes (University of Bergen) has been selected as the chairman of ICOS-18, to be held in Bergen, Norway from 2–5 August 2010.

Sung Ho Kang <shkang@kaist.ac.kr> was chairman of the organizing committee; he is a professor in the Department of Chemistry at the Korea Advance Institute of Science and Technology in Daejeon, Korea.

Bookworm

continued from page 23

tion for the entire symposium. The symposium sessions covered mycotoxins and human health, analytical techniques for mycotoxins, animal feed and dairy products, dried fruits, spices, botanicals and derived products, nuts, cereals and cereal-based products, coffee, cocoa and derived products, risk assessment, regulations and international trade, advances in toxicology, microcystins and other freshwater toxins, lipophylic shellfish toxins, paralytic shellfish poisoning toxins, amnesic shellfish poisoning toxins, and other marine toxins.

A selection of the plenary lectures have been published in a special issue of *Food Additives and Contaminants* [February 2008: 25(2); doi: 10.1080/02652030701788865 for access to the foreword]. This special issue, edited by Hamide Z. Senyuva and Hans P. van Egmond, and is available free online. A selection of the contributed papers on mycotoxins was published in a special issue of *World Mycotoxin Journal* [August 2008: 1(3)]. For titles see http://wageningenacademic.metapress.com/content/120817/. The accepted phycotoxin papers will be published in a forthcoming issue of *Food Additives and Contaminants*.

The 11 plenary lectures published in *Food Additives and Contaminants* reviewed progress in managing and reducing mycotoxins in the food chain, including cattle feed and dairy products, small grains and maize, botanicals and dried fruit, the grape-wine chain, peanuts, hazelnuts, and coffee. These reviews were complemented with papers covering the use of clays to reduce human exposure, examining the impact of mycotoxins on human health in developing countries, and providing an update on analytical tools essential for successful monitoring of reduction strategies.

A quick review of the 19 mycotoxin articles in the symposium issue of *World Mycotoxin Journal* shows that they focus on such areas as analysis, reference materials, occurrence, effects of processing, human exposure, toxicology, mechanism of action, modelling, and (biological) control of mycotoxigenic fungi. The scope of the papers is indicative of the multidisciplinary nature of the symposia. For more information about this special symposium issue, contact the publisher at <sales@wageningenacademic.com>.

World Water Forum

16–22 March 2009, Istanbul, Turkey

The **World Water Forum** is the main water-related event in the world, aimed at putting water firmly on the international agenda. A stepping stone toward global collaboration on water problems, the forum offers the water community and policy and decision makers from all over the world the unique opportunity to come together to create links, debate ideas, and attempt to find solutions to achieve water security.

The World Water Forum, organized every three years by the World Water Council in close collaboration with the authorities of the hosting country, is the largest international event in the field of water. It primarily serves four main purposes:

- to raise the importance of water on the political agenda
- to support the deepening of discussions towards the solution of international water issues in the 21st century
- to formulate concrete proposals and bring their importance to the world's attention
- to generate political commitment

www.worldwaterforum5.org

World Forum on Advanced Materials

IUPAC SPONSORED

20–24 April 2009, Rouen, France

The **World Forum on Advanced Materials** will be held 20–24 April 2009 at the University of Rouen, France. It will be preceded by a one-day 17th Course on Polymer Characterization on April 20.

The conference is intended for researchers, professors, students, and engineers involved in synthesis, characterization, property determination, processing, and manufacturing of novel materials, including thermoplastics, thermosets, alloys, heterogeneous and molecular composites, biomaterials, hybrids, and nanohybrids. The focus of the conference will be balanced among experiments, computer simulations, theory, and model development. The members of the Scientific Committee represent 53 countries. See <www.unt.edu/POLYCHAR>.

Following are the subject matter areas that have been chosen:

- predictive methods
- synthesis
- nanomaterials and smart materials
- mechanical properties and performance
- dielectric and electrical properties
- surfaces, interfaces, and tribology
- rheology, solutions, and processing
- biomaterials and tissue engineering
- characterization and structure-property relationships
- natural and biodegradable materials and recycling

A number of awards will be presented during POLYCHAR 17:

- Paul J. Flory Polymer Research Prize
- International Materials Science Prize
- Bruce Hartmann Award for a Young Scientist and the Juergen Springer Award for a Young Scientist (both for non-students up to the age of 32)
- Carl Klason Prize for the Best Student Paper
- prizes for young investigators and students for outstanding presentations in both oral and poster formats

Rouen is known as the city of one hundred spires, Rouen is in north-west France. It is the capital of the Upper Normandy region and the Seine-Maritime department. The city is bisected by the Seine and three of its small tributaries, Aubette, Robec, and Cailly. There are about 800 000 inhabitants (called Rouennais) in the metropolitan area. Rich in history (Joanne d'Arc), this is one of the few French cities to be decorated with the Legion of Honor. Rouen is an archdiocese seat and the archbishop is the Primate of Normandy. Claude Monet has painted the Rouen Cathedral more times than any other object.

See Mark Your Calendar on page 32 for contact information.

www.polychar17.fr

Thermophysical Properties

21–26 June 2009, Boulder, Colorado, USA

This **Symposium on Thermophysical Properties** is the 17th symposium in the well-established series of conferences on thermophysical properties. The symposium—to be held 21–26 June 2009 in Boulder, Colorado, USA—is concerned with theoretical, experimental, simulation, and applied aspects of the thermophysical properties of gases, liquids, and solids, including biological systems. Conference topics include the following:

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

The 17th symposium will be held in conjunction with the 3rd IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants. Some sessions will be held jointly.

Abstracts for contributions to the Symposium are due electronically by 5 December 2008.

Please contact conference organizers at <symp17@boulder.nist.gov> for further information.

http://symp17.nist.gov/

Functional Molecules from Natural Sources

6–8 July 2009
Magdalen College, Oxford, UK

Naturally occurring compounds have been, and continue to be, an important source of new leads and commercially successful products for various industrial sectors, notably pharmaceuticals and agrochemicals. The last decade has, however, seen many challenges as well as new opportunities for the industrial utilization of molecules form natural sources, including the birth of “neutraceuticals” and “cosmeceuticals.”

The **Functional Molecules from Natural Sources** conference, being organized by The Royal Society of Chemistry, follows two earlier successful meetings organized by the Biotechnology Group of Sussex in 1996 and at the University of St. Andrews in 1999. This conference, which will take place 6–8 July 2009 at Magdalen College in Oxford, UK, aims to highlight current trends, challenges, and successes in the exploitation of natural products.

The conference will be held in the historic setting of Magdalen College in the University of Oxford. It will address significant progress and future directions for natural products.

www.confsec.co.uk/conferences/Functional Mols 2009

Mark Your Calendar

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

2008 (later than 1 November)

IUPAC poster prizes to be awarded

26–30 November 2008 • Soil Science • Pucon, Chile
International Symposium of Interactions of Soil Minerals with Organic Components and Microorganisms
Dra. Maria de La Luz Mora, Universidad de La Frontera, Ciencias de Recursos Naturales, Temuco, Chile, Tel: +56 45 325479, Fax: +56 45 325053, E-mail: mariluz@ufro.cl

2009

IUPAC poster prizes to be awarded

15-17 February 2009 • Radical Polymerization • Melbourne, Australia
Materials of the Future-Science of Today: Radical Polymerization
Dr. Graeme Moad, CSIRO Molecular Science, Bag 10, Clayton South, Victoria, 3787, Australia
Tel.: +61 3 9545 2509, Fax: +61 3 9545 2446, E-mail: graeme.moad@csiro.aul

8–11 March 2009 • Heterocyclic Chemistry • Gainesville, FL
10th Florida Heterocyclic Conference
Prof. Alan R. Katritzky, University of Florida, Department of Chemistry, Gainesville, FL 32611-7200, USA, Tel: +1 352-392-0554, Fax: +1 352-392-9199, E-mail: katritzky@chem.ufl.edu

1–3 April 2009 • Trace Elements in Food • Rome, Italy
3rd International Symposium on Trace Elements in Food (TEF-3)
Dr. Francesco Cubadda, National Centre for Food Quality and Risk Assessment, Istituto Superiore di Sanità, Viale Regina Elena 299, I-00161 Rome, Italy
Tel.: +39 06 4990 3643, Fax: +39 06 4990 2540, E-mail: francesco.cubadda@iss.it

16–17 April 2009 • Clinical Laboratory Diagnostics • Barcelona, Spain
5th European Symposium on Clinical Laboratory and Diagnostic Industry: Standardization and Tumor Markers
Dr. Xavier Filella, Hospital Clínic, Department of Biochemistry & Molecular Genetics, C/ Villarroel 170, E-08036 Barcelona, Spain, Tel: +34 93 227 54 00 x 3141, Fax: +34 93 337 93 76, E-mail: xfilella@clinic.ub.es

20–24 April 2009 • Advanced Materials • Rouen, France
POLYCHAR-17: World Forum on Advanced Materials
Allisson Saiter, University of Rouen, Laboratory L'E.C.A.P., Avenue de l'Université, B.P. 12, F-76801 St-Etienne du Rouvray Cedex, France, Tel.: +33(0)2 32 95 50 86, Fax: +33(0)2 32 95 50 82, E-mail: allison.saiter@univ-rouen.fr

22–24 June 2009 • Vacuum Microbalance and Thermoanalytical Techniques • Lublin, Poland
32nd International Conference on Vacuum Microbalance and Thermoanalytical Techniques (IVMTTC 32)
Prof. Piotr Staszczuk, Maria Curie-Sklodowska University, Dept. of Physicochemistry of Solid Surfaces, Sienkiewicza 1123, PL-20 031 Lublin, Poland, Tel.: +42 81 5375 646, Fax: +42 81 5333 348,
E-mail: piotrs@hektor.umcs.lublin.pl

Visas

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

How to Apply for IUPAC Sponsorship

Conference organizers are invited to complete an Application for IUPAC Sponsorship (AIS) preferably 2 years and at least 12 months before the conference. Further information on granting sponsorship is included in the AIS and is available upon request from the IUPAC Secretariat or online.

www.iupac.org/symposia/application.html

29 June–3 July 2009 • Chemical Thermodynamics • Moscow, Russia
XVII International Conference on Chemical Thermodynamics in Russia (RCCT 2009)
Prof. J.D. Tretjakov, Moscow State University, Department of Inorganic Chemistry, Leninskiy Gory, GSP-2, RF-119991 Moscow, Russia, Tel.: +7 8 495 939 2074, Fax: +7 8 495 939 0998, E-mail: rcct2009@kstu.ru

5–9 July 2009 • Polymers and Organic Chemistry • Montréal, Canada
13th International IUPAC Conference on Polymers & Organic Chemistry (POC-'09)
Prof. Will Skene, Université de Montréal, CP 6128, Succ. Centreville, Montréal, QC H3C 3J7, Canada
Tel.: +1 514 340-5174, Fax: +1 514 340-5290, E-mail: wskene@umontreal.ca

19–24 July 2009 • Novel Aromatic Compounds • Luxembourg City, Grand Duchy of Luxembourg
International Symposium on Novel Aromatic Compounds (ISNA-13)
Prof. Carlo Thilgen, ETH Zürich, Laboratorium für Organische Chemie, Wolfgang-Pauli-Strasse 10, CH-8093 Zürich, Switzerland, Tel.: +41 1 632 2935, Fax: +41 1 6321109, E-mail: thilgen@org.chem.ethz.ch

26–31 July 2009 • Ionic Polymerization • Lodz, Poland
19th IUPAC International Symposium on Ionic Polymerization (IP '09)
Prof. Stanislaw Penczek, Polish Academy of Sciences, Centre of Molecular and Macromolecular Chemistry, Sienkiewicza 1123, PL-90 363 Lodz, Poland, Tel.: +48-42-681 9815, Fax: +48-42-684 7126, E-mail: ip09@bilbo.cbmm.lodz.pl

26–31 July 2009 • Organometallic Chemistry • Glasgow, UK
15th International IUPAC Conference on Organometallic Chemistry Directed Towards Organic Synthesis
Prof. Pavel Kocovsky, University of Glasgow, Department of Chemistry, Glasgow, G12 8QQ, United Kingdom, Tel.: +44 141 330 4199, Fax: +44 141 330 4888, E-mail: pavelk@chem.gla.ac.uk

31 July–6 August 2009 • IUPAC 45th General Assembly • Glasgow, UK
IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org
www.iupac.org/symposia/conferences/ga09/

2–7 August 2009 • IUPAC 42nd Congress • Glasgow, UK
Chemistry Solutions
IUPAC 2009, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK, Tel.: +44 (0) 1223 432380, Fax: +44 (0) 1223 423623, E-mail: iupac2009@rsc.org
www.iupac2009.org

14–18 September 2009 • High Temperature Materials • Davis, CA, USA
High Temperature Materials Chemistry Conference–XIII (HTMC-XIII)
Alexandra Navrotsky, University of California at Davis, One Shields Avenue, Davis, CA 95616 USA
Tel.: +1 530 752-3292, Fax: +1 530 752-9307, E-mail: ANavrotsky@UCDavis.edu

10–14 October 2009 • Molecular Environmental Soil Science • Hangzhou, China
International Symposium of Molecular Environmental Soil Science at the Interfaces in the Earth's Critical Zone
Prof. Jianming Xu, Zhejiang University, College of Environmental & Resource Sciences, Hangzhou, 310029, China, Tel.: +86 571-8697-1955, Fax: +86 571-8697-1955, E-mail: jmxu@zju.edu.cn

2010

IUPAC poster prizes to be awarded

4–8 July 2010 • Pesticide Chemistry • Melbourne, Australia
12th IUPAC International Congress of Pesticide Chemistry
Dr. Elizabeth Gibson, RACI, 1/21 Vale Street, North Melbourne, VIC 3051, Australia, Tel.: +[61] 0 3 9328 2033, Fax: +61 0 3 9328 2670, E-mail: elizabeth@raci.org.au

8–13 August 2010 • Chemical Education • Taipei, Taiwan
21st International Conference on Chemical Education (ICCE-21)—Chemistry Education and Sustainability in the Global Age
Prof. Mei-Hung Chiu, National Taiwan Normal University, No. 88, Ding-Zhou Road, Section 4, Taipei, 116, Taiwan
Tel.: + 886 2-2932-2756, Fax: + 886 2-2935-6134, E-mail: mhc@ntnu.edu.tw

Index for 2008

page(issue)

Bookworm

"Photochemistry for a Better Life", 28(1)
Biophysico-Chemical Processes of Heavy Metals and Metalloids in Soil Environments, 28(2)
Compendi De Nomenclatura De Química Analitica, 30(2)
Environmental Chemistry: Fundamentals and Microscale Laboratory Experiments, 24(5)
Four Laws that Drive the Universe, reviewed by Laurence Lavelle, 25(5)
Functional and Biological Gels and Networks: Theory and Experiment, 29(2)
Green-Sustainable Chemistry, 28(2)
Harnessing Materials for Energy, 25(4)
Heterocyclic Chemistry at a Glance, reviewed by David StC. Black, 30(2)
International Vocabulary of Metrology—Basic and General Concepts and Associated Terms, 21(6)
Mycotoxins and Phycotoxins: Proceedings of the XIIth International IUPAC Symposium, 23(6)
Nomenclatura de Química Inorgánica, 28(1)
Polychar-15 World Forum on Advanced Materials, 29(2)
Self Healing Materials—An Alternative Approach to 20 Centuries of Materials Science, 20(6)
Stop Faking It! Chemistry Basics, reviewed by Parker M. Nelson and Hani Morgan, 23(5)
Systematic Nomenclature of Organic, Organometallic and Coordination Chemistry, 23(6)
The Investigation of Organic Reactions and their Mechanisms, 26(3)

Conference Call

Advanced Materials and Polymer Characterization, Michael Hess, 26(5)
Agrochemicals Protecting Crop, Health, and Natural Environment, N.A. Shakil and Jitendra Kumar, 28(4)
Carbohydrates, Berit Smestad Paulsen, 27(6)
Chemistry in a Changing World—New Possibilities within the IUPAC Family, Michael Droescher, 32(5)
Greenhouse Gases: Mitigation and Utilization, John M. Malin, 35(1), 31(2)
Heterocyclic Chemistry, Roger Reed, 33(1)
Improving Chemical Education in the Phillipines, Fortunato B. Sevilla III, 30(4)
Infrared Spectroscopy Applied to Biological Systems, 30(3)
Malta III Conference, 31(3)
Mendeleev Congress on General and Applied Chemistry, Natalia Tarasova, 34(2)
Modern Physical Chemistry for Advanced Materials, 27(3)
Novel Materials and Fine Chemistry, Yuping Wu, 35(2)
Organic Synthesis, Sung Ho Kang, 28(6)
Photochemistry, Silvia E. Braslavsky, 29(5)
Photodynamics, Jesús Rubayo-Soneira, 26(5)
Physical Organic Chemistry in Latin America, 28(3)
Polymers at the Frontiers of Science and Technology, Christopher K. Ober, 25(6)
Public Health Applications of Human Biomonitoring, Paul Erhardt, 36(2)
Solid State Chemistry, Milan Drábik, Peter Komadel, Tomáš Grygar, 26(6)
The Chemistry of the 21st Century—State of the Art, Mª Angeles Monge, Pilar Goya and José Elguero, 24(6)
The Evolving Identity of Chemistry, D. Thorburns and Brigitte Van Tiggelen, 32(1)
The Future of Science is through Its Students, 34(3)
The Role of Chemistry in Sustainable Agriculture and Human Well-Being in Africa: CHEMRAWN XII, Piet Steyn and Christoff Pauw, 29(5)

Features

Bologna and Beyond: Opportunities and Obstacles, Eva Åkesson, Maja Elmgren, and Kristin Edström, 13(4)
Chemical Education in India: Three Decades of IUPAC Initiatives by N.K. Uberoi and K.V. Sanè, 12(2)
Chemistry for Biology, Torbjörn Norin and Upendra Pandit, 4(2)
Chemistry in the Information and Communications Technology Age, 12(3)
Computers in Clinical Laboratories, Josep M. Queraltó et al., 5(5)
Creativity in Applied Polymer Science, Dick Jones, 3(5)
Functional Foods: Reflections on an Expanding Market, A. Monge et al., 9(5)
Green Chemistry Course for Teachers: Latin American High School Teachers Learn About Sustainable Chemistry, Norma Sbarbati Nudelman, 16(4)
IUPAC in Torino, Italy—Part II, 14(1)
IUPAC—Then and Now: Reflections on 40 Years of Involvement, Jeffery Leigh, 9(6)
Making Modernity at the Chemical Heritage Foundation, Margo Bresnen, 3(6)
Mitigating Arsenic Pollution: Bridging the Gap Between Knowledge and Practice, Hemda Garelick and Huw Jones, 7(4)

Nikolai Izmailov: An Essential Contribution to Physical Chemistry, Nikolay O. Mchedlov-Petrossyan, 14(5)
Physical and Biophysical Chemistry: Where Does IUPAC Stand with Regard to this Discipline?, Christopher Brett and Michel Rossi, 9(3)
Protecting Cultural Heritage: Reflections on the Position of Science in Multidisciplinary Approaches, Jan Wouters, 4(1)
Pure and Applied Chemistry at Your Fingertips, James Bull, 6(6)
Radionuclides and Radiochemistry, Part II: Terminology in Nuclear Processes—Misconceptions and Inaccuracies, Mauro L. Bonardi and David S. Moore, 8(1)
Scientifiques Sans Frontières Australia, Colin Scholes and Glenna Drisko, 8(2)
Spain Celebrates Its Year of Science Honoring Mendeleev, Javier García-Martínez and Pascual Román Polo, 4(3)
The 2006 Year of Chemistry in Korea, Choon H. Do, 4(4)
The Emerging Regulatory Environment: Proceedings of the World Chemistry Leadership Meeting, Colin Humphris and Mark Cesa, 10(1)

From the Editor

Celebrating Two Milestones, inside cover(1)
Comics and Chemistry, inside cover(3)
Creating a Legacy, inside cover(6)
Don't Take Good Ideas for Granted, inside cover(2)
The International Year of Languages, inside cover(4)
Think Like a Computer?, inside cover(5)

Internet Connection

ChemSpider and Its Expanding Web, Antony Williams, 30(1)
The Periodic Table: Database or XML?, Daniel Tofan, 24(3)

IUPAC Wire

Chemical Heritage Foundation Names Thomas R. Tritton President, 20(1)
CHEMRAWN VII Prize for Atmospheric and Green Chemistry, 13(6)
Craig Hawker Wins DSM Performance Materials Award, 17(5)
F. Dean Toste Wins 2008 Thieme-IUPAC Prize, 21(4)
In Memoriam: The Oldest Active Chemist Dies at the Age of Nearly One Hundred, 21(1)
Inviting Young Chemists to the 42nd IUPAC Congress, 13(6)
IUPAC Announces 2008 Winners of the IUPAC Prizes for Young Chemists, 19(4)
IUPAC InChIKey Project Joins Microsoft BioIT Alliance, 19(1)
Jan Heeres Awarded the 2008 IUPAC-Richter Prize, 20(4)
Le VIM Nouveau Est Arrivé!, 18(5)
Luis Oro to become EuChemMS President, 18(2)
Making an imPACt, 17(5)
PAC Text Indexed on ChemSpider, 17(5)
Peter Mahaffy Awarded 3M Canada Teaching Fellowship, 15(3)
Pieter S. Steyn Receives Science for Society Gold Medal, 15(3)
Chemical Heritage Foundation Produces Distillations, 16(3)
Polymer International–IUPAC Award 2008: Call for Nominations, 19(1)
Water in the Gaza Strip, 18(2)
XML Gold Book—2.0 release, 14(6)
Zafra Lerman Receives George Brown Award for International Scientific Collaboration, 21(1)
Zhenan Bao Awarded First Polymer International-IUPAC Award, 19(4)

Making an imPACt

Acetonitrile: Ternary and Quaternary Systems, 27(2)
Alcohols with Water, 27(1)
Band Broadening Function in Size Exclusion Chromatography of Polymers, 27(2)
Chemists and the "Public": IUPAC's Role in Achieving Mutual Understanding, 21(3)
Definitions of Terms Relating to the Structure and Processing of Sols, Gels, Networks, and Inorganic Hybrid Materials, 27(1)
Further Conventions for NMR Shielding and Chemical Shifts, 20(3)
Glossary of Terms Related to Solubility, 22(3)
Impact of Scientific Developments on the Chemical Weapons Convention, 23(3)
Nomenclature for Rotaxanes and Pseudorotaxanes, 18(6)
Performance Evaluation Criteria of Macro- and Microfabricated Ion-Selective Electrodes, 21(3)
Recommendations on Measurement and Analysis of Results Obtained on Biological Substances Using Isothermal Titration Calorimetry, 18(6)
Representation of Configuration in Coordination Polyhedra, 27(1)
Solubility Data Series, 19(6)
Standards for Chemical Structure Diagrams, 23(3)

Structure-Based Nomenclature for Cyclic Organic Macromolecules, 22(3)
Transport of Pesticides via Macropores, 20(3)

Mark Your Calendar
Listing of IUPAC-Sponsored Conferences and Symposia, 40(1), 40(2), 39(3), 32(4), 36(5), 32(6)

Officers' Columns
Adding a Stone to the IUPAC Edifice, Nicole J. Moreau, 2(3)
Membership in IUPAC, Bryan Henry, 2(6)
Moving Toward an International Year of Chemistry, David StC. Black, 2(4)
The Role of ICTNS in the Project System, Jack Lorimer, 2(2)
Toward Global Leadership in Knowledge Sharing, Jung-Il Jin, 2(1)
Was Midas a Chemist?, John Corish, 2(5)

The Project Place
"Global Climate Change"—Monograph for Secondary Schools, 24(1)
A Glossary of Concepts and Terms in Chemometrics, 15(6)
A Multilingual Encyclopedia of Polymer Terminology, 24(1)
Analogue and Standalone Drugs, 20(5)
Analysis of the Usage of Nanoscience and Technology, 18(3)
Applied Thermodynamics of Fluids, 19(5)
Biophysico-Chemical Processes of Anthropogenic Organic Compounds in Environmental Systems, 23(4), 19(5)
Chemical Issues in Biomass Burning in Sub-Saharan Africa, 22(2)
Critically Evaluated Techniques for Size Separation Characterization of Starch, 22(4)
Development of an Isotopic Periodic Table for the Educational Community, 24(4)
Electrochemical DNA-Based Biosensors: Terms and Methodology, 23(1)
Extension of ThermoML, 18(3)
Future Energy: Improved, Sustainable, and Clean Options for Our Planet, Trevor Letcher, 20(2)
Glossary of Terms Used in Immunotoxicology, 21(5)
Green Book: Abridged Version, 21(2)
Green Chemistry, Sustainable Development, and Social Responsibility of Scientists, 23(2)
Mechanistic Aspects of Chemical Vapor Generation of Volatile Hydrides for Trace Element Determination, 17(3)
On the Environmental Impact of Altered Pesticide Use on Transgenic Crops, Gijs Kleter, 19(2)
Options for IUPAC Engagement in SAICM Implementation, 16(6)
Postgraduate Course in Polymer Science, 21(2)
Preparation for the Translation of the "Green Book", 21(5)
Recent Advances in Nomenclature, Properties and Units: Strategy for Promoting SC-NPU Achievements, 23(1)
Recommendations for Codes of Conduct, 24(1)
Revision of the Silver Book, 15(6)
Strategic Planning for a New East Asian Network for Organic Chemistry, 22(4)
Theoretical Methods for the Study of Reactions Involving Global Warming Gas Species Degradation, 17(3)

Provisional Recommendations
Dispersity, 24(4)
Explanatory Glossary of Terms Used in Expression of Relative Isotope Ratios and Gas Ratios, 26(2), 19(3)
Glossary of Class Names of Polymers Based on Chemical Structure and Molecular Architecture, 26(2), 19(3)
Glossary of Terms Used in Ecotoxicology, 22(5), 17(6)
Glossary of Terms Used in Pharmaceutics, 26(1), 25(2)
Metrological Traceability of Measurement Results in Chemistry, 26(1)
Terminology for Radical Polymerizations with Minimal Termination—The So-Called "Living" and/or "Controlled" Radical Polymerization, 24(4)
Thermochemistry of Chemical Reactions: I. Terminology and Symbols, 22(5), 17(6)

Stamps International, Daniel Rabinovich
A Hydrocarbon to Be Proud of, 7(1)
Erasers, Rubber Duckies, and So Much More, 4(5)
Libby and the Nuclear Hourglass, 12(6)
Petrochemicals Galore, 6(4)
The Father of Toxicology, 3(2)
Triads, Triads, Everywhere, 11(3)

Tools of the Trade
Analytical Terminology and the Orange Book, Roger M. Smith, 13(3)
Solubility Data Compilations for the Practicing Chemist, Heinz Gamsjäger, John W. Lorimer, and David G. Shaw, 16(2)

Index for 2008

page(issue)

Up for Discussion

Council Round Table Discussions: Actions Arising from Torino, 14(2)

Internet Chemistry for Developing Countries, Gedion Getahun, 18(4)

Where 2B & Y

Applied Thermodynamics, 29 May–1 June 2008, Cannes, France, 38(1)

Challenges in Organic and Bioorganic Chemistry, 22–25 July 2008, Berkeley, California, USA, 37(3)

Chemistry for Sustainable Development, 23–25 May 2008, Kathmandu, Nepal, 38(2)

Chemistry in a Changing World—New Perspectives Concerning the IUPAC Family, 25 April 2008, Marl, Germany, 41(1)

Chemistry Industry and Environment, 20–23 November 2008, Principality of Monaco, 38(3)

Emulsion Polymers, 2–6 June 2008, Bethlehem, Pennsylvania USA, 38(1)

Functional Molecules from Natural Sources, 6-8 July 2009, Magdalen College, Oxford, UK, 31(6)

Green Chemistry, 10th Summer School, 12–18 October 2008, Venice, Italy, 32(4)

High Temperature Materials, 14–18 September 2009, Davis, CA, USA, 34(5)

Humic Substances, 14–20 September 2008, Moscow to St. Petersburg, Russia, 38(2)

Macro- and Supra-Molecular Architectures and Materials, 7–11 September 2008, Düsseldorf, Germany, 37(3)

Macromolecules and Materials, 8–11 September 2008, Kruger National Park, South Africa, 38(2)

Molecular Modeling and Drug Design, 10–14 September 2008, Istanbul, Turkey, 31(4)

Nano-Bio & Clean Tech, 27–30 October 2008, Burlingame, California, USA, 38(3)

Physical Organic Chemistry, 13–18 July 2008, Santiago de Compostela and A Coruña, Spain, 36(3)

Polar Research, 8–11 July 2008, St. Petersburg, Russia, 38(1)

Polymer Processing, 15–19 June 2008, Salerno, Italy, 39(1)

Polymeric Materials, 24–26 September 2008, Halle-Wittenberg, Germany, 31(4)

Safe Food, 24–27 September 2008, Novi Sad, Serbia, 36(3)

Solid State Chemistry, 6–11 July 2008, Bratislava, Slovakia, 39(1)

Solubility and Equilibria, 27–31 July 2008, Dublin, Ireland, 37(2)

Stable Isotope, 31 August–5 September 2008, Presqu'île de Giens, Var, France, 39(1)

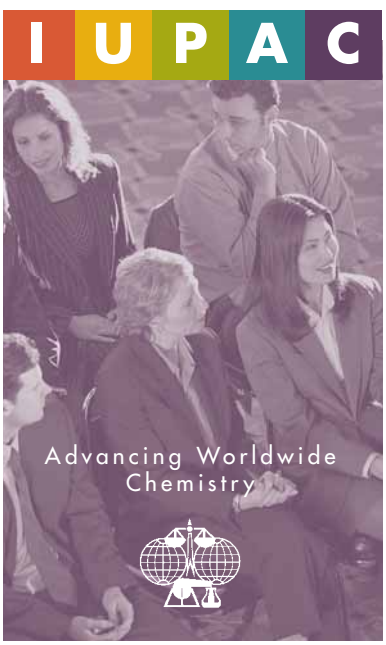
Thermophysical Properties, 21–26 June 2009, Boulder, Colorado, USA, 39(2)

Trace Elements in Food, 1–3 April 2009, Rome, Italy, 34(5)

Vanadium, 17–19 July 2008, Lisbon, Portugal, 37(2)

World Forum on Advanced Materials, 20–24 April 2009, Rouen, France, 30(6)

World Water Forum, 16–22 March 2009, Istanbul, Turkey, 30(6)



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