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

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Volume 29 No. 4

Young Ambassadors for Chemistry in South Africa

Sustainable Development and Education

Speaking to the Public About Chemistry

From the Editor

If you are a member, a fellow, or an affiliate, and receive *Chemistry International* (*CI*) regularly, **I have a job for you**. Go next door, have a coffee break with your colleague, and have a chat about IUPAC. Surely, you must have an IUPAC project or two on your radar screen that you can use as an example to explain the sort of things IUPAC does. There is more to us than nomenclature and terminology. So, pick what tickles your interest most and go share your enthusiasm with your peer. *CI* is just one medium, but surely the website is a more complete resource, as is the scientific journal *Pure and Applied Chemistry*, which includes all IUPAC technical reports and recommendations.

One does not need to be actively involved in a project to appreciate its value. In an organization of volunteers, where an individual's expertise is the key value, everyone's involvement is appreciated. In fact, one of the best ways to support IUPAC is by encouraging your colleague to become an affiliate.

IUPAC provides an infrastructure to address global issues and facilitate communication among chemists worldwide. The tools IUPAC provides in terms of standardization and scientific discussion are a necessity for the continued development of chemistry and chemistry applications. Individuals from different countries unite in working on chemistry-related issues with the goals of developing solutions and initiating standards.

Affiliates receive discounts on specific IUPAC publications, including *PAC*, and reduced registration fees for most IUPAC-sponsored conferences. In addition, affiliates are kept informed about IUPAC activities through *CI*, and via the bimonthly e-news letter that provides website updates.

While IUPAC uses its global perspective to fulfill its mission and contribute to the application of chemistry in the service of Mankind, we ask you to use your local perspective to expand and diversify the IUPAC network. Tear off the last page of this issue and have your colleague return it to us. Thanks in advance for your help spreading the word about the role of IUPAC—and have an enjoyable coffee break.

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

Cover: The week-long Young Ambassadors for Chemistry (YAC) event culminated in the central square of Grahamstown, South Africa, where the teenagers pictured interacted with the public and showed them what they had learned about chemistry. Around 80 students in their school uniforms spent the afternoon on the square showing the public that chemistry is part of life and that it can also make it better. The square was decorated with posters from the competition Chemistry for Humanity. See report on page 21.

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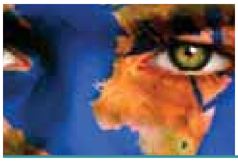

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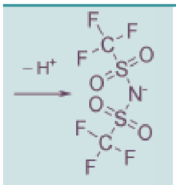

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Streamlining IUPAC Operations

by Bryan R. Henry

The goal of the ad hoc Committee for Streamlining IUPAC Operations, established in October 2006, was to find operational efficiencies within the existing IUPAC structure (see Nov-Dec 2006 *CI*, p. 2). The members of the committee were Michael Jaffe, Anders Kallner, Venceslav Kaucic, Fabienne Meyers, Kook Joe Shin, and myself as chair. The committee was aware that changes in the operational structure of IUPAC were debated, but not accepted at our last two Council meetings. However, there were significant expressions of support for measures to make IUPAC operations more efficient. Suggestions came from several members of the Union as well as from the committee members. As our starting point, the only real constraint was to consider suggestions that introduced streamlined procedures without altering the current structure.

The report of the committee will be presented at both the Bureau and Council meetings at the General Assembly this August in Torino. As a precursor to those discussions, I thought it would be helpful to provide some background to the committee's deliberations and to summarize its conclusions. The report was considered at the recent meeting of the Executive Committee (EC). All but one of the recommendations could be implemented without changes to IUPAC Statutes and Bylaws. The committee report was approved by the EC, and the executive director was asked to add the appropriate recommendations from the report to the list of Bureau/EC action items. Thus, many of the efficiencies have been put in place and will affect our deliberations at the General Assembly in Torino.

At the outset, the committee sought to clarify the respective roles of the EC, the Bureau, and Council. The EC's role is to make operational decisions, to present policy and strategic initiatives to the Bureau for decision, to establish and appoint ad hoc groups to address and give advice on specific issues, and to advise the president on the appointment of standing committee members and chairs. A change was made in the schedule of the meetings so that in the future EC members would have a brief meeting immediately after the conclusion of the Bureau meetings to review and implement pending actions. This would lead to two meetings of the EC per year (*vide infra*).

The Bureau elects three members of the EC, makes decisions on policies to be ratified by the Council, identifies and monitors strategic issues for in-depth discussion by the EC, reviews and identifies the role of the Bureau and the tasks of its members at the first meeting of the Bureau following Council, fills casual vacancies on divisions and standing committees as well as temporary vacancies among officers, and ratifies decisions of the EC. The streamlining committee recommended that a motion be brought to Council to extend voting rights on the Bureau to operational standing committee chairs. Despite the fact that these standing committee chairs are appointed to the Bureau rather than elected, it was felt that they should function as full Bureau members.

The duties of Council are clearly laid out in our Statutes and Bylaws. While the report emphasizes the key roles of Council, no substantive changes in responsibilities were recommended. However, several operational changes were suggested and will be implemented for the Torino Council meeting. We will have a more detailed annotated agenda for the Council with proposed time allocations for each item, references and links to any supporting documentation, and a series of expected actions and possible motions. Agenda items will be identified as "for discussion," "for decision," or "for information."

"Information" items will generally consist of written reports received from IUPAC bodies, and these reports will be received for information without oral repetition. Discussion will be restricted to questions and clarifications. The purpose of these changes is to allow us to deal with routine matters more expeditiously. Hopefully, the changes will allow Council more time to think strategically and to engage in real discussions of matters that are important to the Union and its members.

The committee asked David StC. Black, John Jost, and Fabienne Meyers to reconsider the General Assembly schedule. A series of schedule changes have been instituted that will begin after the Council meeting in Torino. The main effect of these changes is the elimination of the Bureau meeting from the General Assembly. Instead, the Bureau will meet during the first quarter of each year (around April/May), while the EC will hold its annual meeting in the fourth quarter of the year. One advantage of this revised schedule would be a shorter overall General Assembly, but just as important is that the EC and Bureau members would begin work much earlier in the biennial cycle, with the EC meeting only two or three months after the General Assembly and the Bureau six months later. Currently, many of the Bureau members have no real contact with IUPAC for almost a year before the first meeting.

The committee recommended that priority be given to improving the communication potential and utility of the IUPAC website. It also made a series of recommendations to improve communication within the IUPAC community. These included assigning responsibility to elected members of the Bureau, and to division titular and associate members, for maintaining liaison with National Adhering Organizations (NAOs) and Associated NAOs. In addition, the Secretariat will determine if other parallel communication channels would be helpful in bringing information to NAOs and to the attention of chemical and other relevant national groups.

These changes are substantive. Some, like the change in schedule, will be put in place for a trial period and then reassessed. Overall, the committee and the EC are confident that the changes will result in a better operation, and in improvements in communication. These changes should enable a more efficient achievement of our six strategic goals and contribute to our overall aim of advancing worldwide chemistry.

Bryan R. Henry <chmhenry@uoguelph.ca> has been IUPAC president since January 2006. He 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.

Stamps International

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

Mendeleev's Triumph

The periodic table of the elements—the venerable icon of chemistry found today in classrooms throughout the world and in many of our purses and wallets—was devised in 1869 by the eximious Russian chemist Dmitri Mendeleev (1834–1907). Several individuals before him, including Döbereiner, Newlands, de Chancourtois, and Meyer, had come up with alternative proposals to organize the chemical elements known at the time. However, Mendeleev's key to success was to reserve empty spaces in his classification and even predict the basic physical and chemical properties for elements yet to be discovered, including those he tentatively named ekaaluminum, ekaboron, and ekasilicon. Within a few years, the discovery of gallium by Paul Emile Lecoq de Boisbaudran (1875), scandium by Lars Nilson (1879), and germanium by Clemens Winkler (1886), validated his predictions and brought his periodic table widespread recognition.

The stamp that illustrates this note was issued on 2 February 2007 in Spain to commemorate the 100th anniversary of Mendeleev's death. In an attractive design reminiscent of a Piet Mondrian composition, the stamp depicts with different colors the four main neighborhoods in the periodic table that separate the elements by their electron configurations (i.e., the s-, p-, d- and f-blocks). The stamp also shows four white boxes or "holes" for the elements lighter than the rare earths whose existence was predicted by Mendeleev in 1869. Interestingly, although the discovery of gallium, scandium, and germanium catalyzed Mendeleev's ascent to posterity, the isolation of his ekamanganese would have to wait almost seven decades, until 1937, when Carlo Perrier and Emilio Segrè at the University of Palermo isolated technetium, the first artificial element and the only radioactive transition metal.

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

The designer of the stamp—Javier García Martínez—is an active IUPAC member and a professor of inorganic chemistry at the University of Alicante in Spain. Not many chemists (or IUPAC members) get involved in postage stamp designing!

Where Does Chemistry Fit?

by Rietje van Dam-Mieras

As a chemistry student at Utrecht University I very much enjoyed student life and chemistry. Sharing the joy of student life with fellow students from a broad range of disciplines was easy, but sharing the beauty of chemistry as a subject was far more difficult. When I told them about chemistry the reaction often was "Oh, how interesting," and then the discussion stopped. I almost envied students in medicine, law, or the social sciences because communication about their field of interest was much easier. The rather abstract and ratio-based approach to chemistry made sharing its beauty with others rather difficult. These experiences certainly influenced my decision to apply my chemical knowledge on sustainable development and education.

Knowledge and Education: Back to the Roots

From a modern European perspective, chemistry is part of the natural sciences and has its roots in classical Greek natural philosophy. Greek natural philosophers tried to understand their physical environment and the changes taking place in it by observation, the construction of mental models based on these observations, and by challenging these mental models during discussions with others.

A very important question for (natural) philosophers was "What is a good life (in a moral sense)?" In this context they determined substantial and instrumental rationality. Instrumental rationality involved the best ways to realize an objective; we presently would call this effectiveness and efficiency. Substantial rationality was about authentic principles to which a person freely commits oneself; we would presently call this norms and values.

For discussions about these subjects the philosophers relied on scolè (the origin of the word "school"), which is free space to think together about common authentic values and principles. In those days, education was in the hands of private teachers who gathered with their audiences in informal environments like sport schools (gymnasia). The "students" were free (male) citizens; slaves and women could not participate. Over time, the use of education to deliberately influence peoples' behavior became increasingly important. Schools were no longer about creating free space to think together, but were about realizing predetermined learning objectives for specified target groups.

During the 17th century, the period known as the Enlightenment, great changes in the methodology for knowledge generation took place in Europe.[1] The process of observing was supported by instrumentation and experimentation. Discussions not only were organized in academies of science, but also became more independent of time and place because of the development of scientific journals. Also, the standardization of scientific methodology, the system of control of scientific quality by peers, and the use of disciplines as an organizing principle in scientific work, date back to those days. We can also recognize these historical developments in the way the educational system is organized, especially in secondary, higher, and vocational education, where the disciplinary approach is an important organizing principle.

Within the disciplinary domain, scientists share their mental models and speak a common disciplinary language. The development of scientific disciplines paved the way for the Industrial Revolution, which started in Europe in the 18th century and resulted in drastic changes in technology, economy, and society, and created welfare, at least in industrialized societies. It also contributed to the development of nation states responsible for the public interest, for a proper functioning of economic markets, for safety, and for the development of social institutions that constitute a safety net for their citizens. Welfare in these nations was to some extent shared among citizens and resulted in increased possibilities for individual development. The Industrial Revolution certainly contributed to the development of welfare and the growth of the economy, very often with an emphasis on material welfare.[2] However, it has become clear that the patterns of production and consumption that have their roots in this revolution are not sustainable.

The old economy was about dealing with scarcity. How scarce means are used is determined by social-economic and cultural conditions. In other words, economy is a normative science. Before the Enlightenment, economy was part of moral philosophy. Through the developments during the knowledge revolution of the 17th century, especially those in the field of mathematics and mathematically based ways of quantification, modelling and simulation, economy developed into an independent discipline.[2] The quantification and modelling dimensions of the economic discipline made it an important instrument in the hand of political and business leaders who are always looking for images of the future that allow for policy development with a certain (perceived) degree of certainty. The balance between substantial and instrumental rationality has been shifted in the direction of the latter by these developments.

The disciplinary approach in scientific research certainly has been, and still is, of great value for fundamental research, but it is not the most optimal way to diagnose and remediate—or better prevent—societal problems. A disciplinary approach to societal problems implies that problems have to be formulated and solved within disciplinary domains by academics. This guarantees knowledge of good scientific quality, but, since societal complexity is lost by reducing a complex problem to a research question that fits within the disciplinary domain, the solutions provided may be rather removed from the reality of daily life. Knowledge to solve societal problems should not only be of good scientific quality, it should also be robust from a societal standpoint, a fact that requires multi-, inter-, and transdisciplinary approaches.* One could therefore conclude that after a few centuries of applying a reductionist approach in science—which is still very valuable within specific scientific domains—we must search for more integrated scientific approaches.

The historic developments described above are also reflected in the way chemistry is dealt with in education. Traditionally, the starting point for chemistry education tends to be rather abstract and ratio based—an approach that doesn't appeal to all youngsters, many of whom place more importance on emotional and social fulfilment. Thus, we should question whether a chemistry curriculum that reflects, to a large extent, the historical development of the field is still optimal to educate the young people of today to become the world citizens of tomorrow.

One could state that there are two important objectives for education today:

- helping students understand the physical and social environment and the changes taking place in those environments
- creating free space to think together about common authentic values and principles

In order to realize these objectives, both natural and social sciences are needed in education. There will always be different accents in individual learning trajectories according to personal preferences and labor-market conditions, and yet aspects of globalization, cultural diversity, and sustainable development should be considered. Chemistry can help achieve both educational objectives given above, but this very often is difficult because of the way chemistry is dealt with in education.

> *. . . we should question whether a chemistry curriculum that reflects, to a large extent, the historical development of the field is still optimal . . .*

In the Netherlands, the new chemistry curriculum for upper secondary education that is presently being developed is an encouraging step in the right direction.[3] It follows a "concept-context" approach. A limited amount of chemical concepts are introduced, starting from a societal context, and are further developed by applying the concepts in other contexts. Thus, chemistry is presented as part of a much larger system. For biology and physics, comparable approaches have been developed, which makes the separation between the different natural sciences less sharp. This is an encouraging first step, but much remains to be done. How about the interaction between natural and social sciences? What is the place of natural sciences and technology in primary education? Does a more integrated approach to societal problems create consequences for university education? Of course, one must master a discipline before one is able to use multi-, inter- and transdisciplinary approaches, but education should also enable people to obtain the competencies to do so.

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* Multidisciplinarity means approaching a problem from different scientific perspectives. Interdisciplinarity means the cooperation of different scientific disciplines and the integration of different disciplinary perspectives, theories, and methods. Transdisciplinarity refers to cooperation among experts in possession of practical experience from outside the academic world.

Sustainable Development: A Challenge to World Citizens and an Inspiration for Chemistry

From a historical perspective, sustainable development could be described as a political compromise between the so-called developed world, concerned about the ecological consequences of its production and consumption, and the so-called developing world, concerned about economic development. The report *Our Common Future* of the World Committee on Environment and Development, chaired by the former Norwegian Prime Minister Gro Harlem Brundtland, was a result of this compromise.[4] Sustainable development can also be described as a process of change during which societies and their citizens learn to deal with the tension between ecological sustainability and economic development while doing justice to interests at both the local and the global level.[5]

If we accept that our present society is a globalizing society, an important point to consider is that globalization exceeds the traditional frames of reference societies have. Every culture has its own specific world view, which is an important factor in its set of norms and values. Asking ethical questions such as "What is a good life in a moral sense?" in a global society, therefore, quickly results in "defending our values against theirs."[2]

At the onset of the 21st century, many people realize that more integrated approaches to global and/or societal problems are needed. Ecological economics is concerned with extending and integrating the study of managing nature's household (ecology) and humanities' household (economy) <www.ecoeco.org>. The Earth Charter <www.earthcharter.org> wants to function as a broadly accepted frame of reference underlying development. Through this movement, companies are encouraged to work on Corporate Social Responsibility in order to balance people, profit, and planet.[6] In addition, many United Nations projects encourage sustainable development. However, as media coverage demonstrates, this process of change can be quite difficult.

In everyday life, sustainable development means dealing with dilemmas in complex societal settings and making decisions under uncertainty. While the precautionary principle can be applied, dealing with uncertainty remains difficult. This is especially true in environments focused on providing certainty.

For these reasons, sustainable development should receive a prominent place in education at all levels. Koïchiro Matsuura, director general of UNESCO, formulates this concept as follows: *"Education—in all its forms and all its levels—is not only an end in itself, but is also one of the most powerful instruments we have for bringing about the changes required to achieve sustainable development."*[5]

Education for sustainable development means empowering individuals to deal with dilemmas in complex societal settings. It also means taking into account the interaction between local (daily life) and global (economic, climate system, and world ecosystem) forces. Students must be taught how to use multi-, inter-, and transdisciplinary approaches and how to work together in teams with people from different disciplinary, social, and cultural backgrounds. Education for sustainable development should be focused on identifying competencies and developing appropriate learning environments and processes, rather than on defining the exact type of knowledge that learners should acquire. Needless to say that learning environments in traditional—disciplinary oriented—curricula have severe shortcomings in this respect. Sustainable development education aimed at individuals and organizations requires innovative learning environments and approaches. It should be seen as a life-long process that takes place in formal (the education system), non-formal (training on the job), and informal (museums, zoos, vacations) learning environments.

A relevant project is the Regional Centres of Expertise (RCEs) initiative of the United Nations University (UNU), part of the UN Decade of Education for Sustainable Development. UNU created a network of RCEs on Education for Sustainable Development.[7] The goal of these regional centers is to organize activities locally that (a) enhance collaboration among different levels of education (i.e., primary, secondary, and higher education) and (b) facilitate relations between schools and research centers, local businesses, museums, and local governments. Hopefully, this network will develop into a global learning space for sustainable development.

Chemistry: A Science for Change

The potential of chemistry for sustainable development is high. In recent decades chemistry has begun to change from a science focused on structure and reactivity of individual molecules to a science concerned with complete molecular systems. It is part of the core of life sciences, nanotechnology, macromolecular chemistry, and new materials. Chemistry can contribute to solving challenges in many fields, such as renewable energy and energy efficiency, water use and sanitation, renewable resources, healthcare, nutrition, quality control of production chains, process (re)design, and catalysis. But meeting societal challenges means dealing with complex problems and uncertainty. Chemists can not do the job alone, they will have to work with people from a wide range of disciplines, experts, and stakeholders.

Research studies have shown that technology and society develop in a process of co-evolution: New ideas are tried out in society and in this way society directs technological development. On the other hand, with time, new technologies like ICT and those based on molecular sciences (biotechnology, nanotechnology, genomics, proteomics, metabolomics, nutrigenomics, pharmacogenomics) will influence society and societal norms and values. The societal influence on technologies involving molecular sciences will be more direct than on fundamental molecular sciences of course. The market will encourage incremental innovation and optimization of existing technologies, but the fundamental sciences are necessary for more radical changes and innovations.

Employing chemistry for sustainable development raises some interesting questions:

- Can a strategy for chemistry for sustainable development be determined at a national level?
- If chemistry is seen as a source of inspiration for innovations for sustainable development, what are the consequences of chemistry education?
- How could a dialogue between the international community of chemistry professionals and the global community be effective and productive?
- What role could an international organization, such as IUPAC, play?

Fortunately, we don't have to start from scratch because there are inspiring examples. For instance, the recently published report *Chemically Related Organizations and Developing Countries*[8] and the *Conference Report of the 2nd ICSU Regional Consultative Forum for Africa*.[9] The former reports the results of a consultation by the American Chemical Society's Committee on International Activities with a number of government organizations active in furthering science, technology, and innovation in developing countries. The latter reports the results from an ICSU forum held in Boksburg, South Africa, from 25–27 September 2006.

It seems clear that efforts to create more sustainable development present an opportunity to unveil the too often hidden potential and beauty of chemistry to a larger public. Could this opportunity also inspire innovations in chemistry education?

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Speaking to the Public About Chemistry

A Three-Point Primer

by David A. Evans

At IUPAC's 2005 General Assembly in Beijing, Peter Mahaffy, now chair of the Committee on Chemistry Education, and his team concluded that one of the definitive contributions that IUPAC could make to enhancing the public appreciation of chemistry would be to improve the communication-skills of chemists.

This article, in line with the Committee on Chemistry and Industry's (COCI) remit, provides some simple tips and hints on public communication that might be of particular use to chemists in industry. Whereas the information has relevance to all sectors, it should be noted that many chemists in industry are called upon relatively rarely to speak to the public on chemical topics and many have little formal experience addressing audiences—in contradistinction, for example, to colleagues in academia. Much of the list is nothing but common sense, but some might find it useful for it to be collected in one place. However, it is recognized that this list cannot take the place of a training course featuring practical work.

The author has no claim to expertise in this topic. The material presented is the result of lessons learned in a lifetime of both receiving and giving some dreadful lectures. Here are some of the lecturers you might meet on the circuit:

- the *Fugitive*, who regards the lecture as torture and reads in terror from a shaking script with a faltering voice (we've all been there!)
- the *Bombast*, who loudly blasts the audience and browbeats them into submission with relentless personal logic
- the *Thespian*, who tries to impress with deep dramatic sincerity using hushed tones and anguished facial contortions
- the *Columbo*, who relates his/her work as a "whodunnit" detective story with the only worthwhile point revealed at the bitter end
- the *Conceited*, who irritatingly displays a confident air of clever self-satisfaction and regards the audience as another source of adulation
- the *Bamboozler*, who came along to show off an exquisite intellectual brilliance by purposely drowning the audience in complexity
- the *Failure*, who catharts all over the audience and details the serial difficulties and disappointments encountered
- the *Techy*, whose 3-D histogram slides resemble the Manhattan skyline and whose turn of phrase would honor *Star Wars*

Then there's the *Entertainer*, the *Mumbler*, the *Village Idiot* . . . and then us!

The article assumes that a lecture presentation to the lay public has been requested. It is divided into three sections:

1. preparing for the lecture
2. presenting the lecture
3. follow up

Preparing for the Lecture

This is the most important factor for ensuring a successful presentation—and by far the most time-consuming. Success or failure is dictated here.

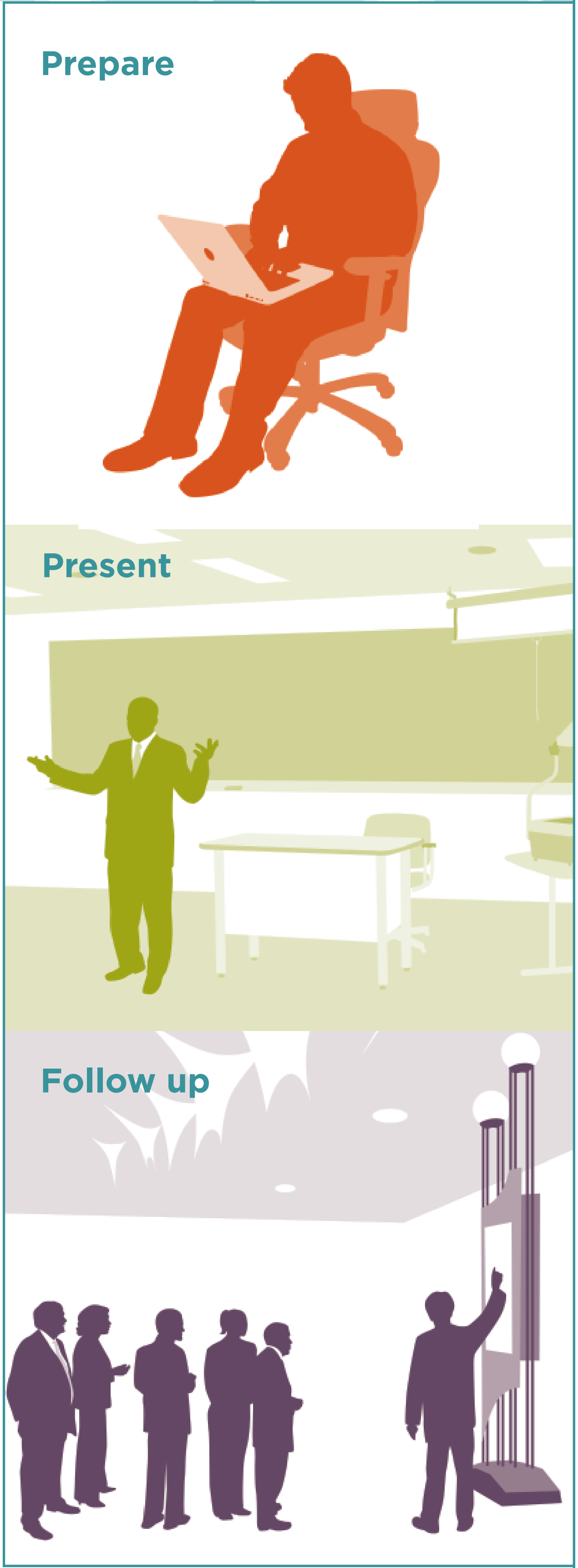
- **Understand your audience**
  - Find out from the organizer or an earlier speaker to the same audience the general level of knowledge of the attendees and pitch the lecture accordingly.
  - Simplification of a topic for an audience is almost never regarded as patronizing—whereas talking above them is never forgiven.
- **Get a description of the venue**
  - Ascertain the type of visual aids available and find out the dimensions of the lecture room. Size your visual aids accordingly.
- **Be clear about audience expectations**
  - Provide the organizer with a brief synopsis of your intended talk (best done verbally) and again explain the level at which you intend to pitch it.
  - Find out the expected duration of the talk and whether there will be time allotted for questions.
  - Ask the organiser whether there are specific audience expectations (e.g., discussion of a current news topic or local event).

- **Ascertain the requirements of the organizer(s)**
  - Establish whether you will be expected to submit a paper for publication, or to provide a written paper or summary.
  - Ask if the press will be present (it is not uncommon for local reporters to attend public lectures) or shall you be required to attend a press briefing?
- **Decide on the structure and key messages of the talk**
  - Choose a small number of key messages and state what they are.
  - Be resolute in omitting favorite material that does not contribute to the key messages.
  - Avoid audience overload by allowing some slack in timing—and never plan to run over!
- **Prepare appropriate visual aids and any manuscripts required**
  - Use the most effective visual aid system available, but keep it simple. “Whiz Bang” for its own sake will distract from the messages.
  - Make sure that slides are not too crowded—no more than six main bullet points per slide. Slides must be visible (all the words!) from the very back of the room—someone always sits there.
  - Avoid having too many slides—a common mistake. If you need to rush, you will lose your audience; if you run over you will frustrate them and nobody will be listening to you.
  - At all costs, avoid using complexity, either visual or written, to try to look clever. A speaker who purposely overwhelms an audience is foolish and is recognized as such by the audience.
- **Practice makes perfect**
  - Dry-run your presentation with visual aids until the timing and content meet your approval.
  - Be aware that many accomplished off-the-cuff speakers are dedicated to practice and training—but without killing spontaneity.

Presenting the Lecture

This objective takes relatively little time, but the memories, good or bad, stay with you eternally. A little foresight pays large dividends.

- **Set up the lecture room**
  - Visit the lecture room well ahead of the arrival



of the audience and familiarize yourself with the equipment and facilities.

  - Load up and check your visual aids right through—many good lectures have been ruined by unexpected projector incompatibility or differences in PowerPoint versions.
- **Brief the chair**
  - In order for you to be introduced by the chair, provide a brief CV and remember that nobody will be interested in your early school days!
  - Inform the chair whether you will take questions during your talk or whether you would prefer these at the end-the latter is much preferred when addressing an unfamiliar audience.
  - Ask the chair to give you a discreet five-minute warning prior to the end of your talk —and respect it!
- **Stand and deliver—clearly, cogently, energetically, and to time**
  - If in doubt, ask the audience whether you can be heard at the back.
  - Use written notes as an occasional prompt, but to read verbatim from a manuscript is normally unforgivable.
  - Abbreviated prompts written on index cards are more effective than a highlighted manuscript, where it is too easy to get lost.

> *You will be judged on the extent to which your material engages your audience as much as its scientific merit.*

  - Inexperienced speakers often rely on the security of having a complete manuscript against the possibility of "drying up." This is acceptable provided the speaker returns to normality once the panic has passed.
  - Your most visible attribute will be your perceived energy level—if you allow this to drop, the audience will follow you. Make sure you retain eye contact with all parts of your audience throughout.
- **Engage your audience**
  - You will be judged on the extent to which your material engages your audience as much as its scientific merit.
  - You can put your audience at ease at the outset with one or two informal comments or anecdotes which "humanize" yourself, but avoid convoluted jokes.
  - Start by stating the messages that you intend to cover—and repeat them again as your conclusion. The messages should be reflected in your slide material.
  - Use of the second person plural as in "You will know from your daily experiences . . ." or "In your medicine cabinet at home . . ." helps to make material more relevant to the audience and promotes engagement.
  - Never fall into the temptation of promoting your favorite topic by unreasonably denigrating a competing scientific approach—the casualty will be science as a whole.
  - It is unforgivable to attempt to demonstrate how smart you are by bamboozling your audience. Your job is to engage and to explain—not to try to impress.
  - Remember that your audience attends your lecture to be both informed and entertained—in balanced amounts.
- **Check your audience for understanding**
  - Direct questioning of the audience ("Is everybody with me?"); ("Am I going too fast?") is unlikely to provide a truthful answer, given the milk of human kindness!
  - Indirect questioning ("How many of you think that . . . ?"), ("Hands up those who believe that . . . ?") is much more effective in both gauging understanding and keeping interest.
  - Observation of all corners of the audience will provide clues, as will listening for audible clues (murmuring, shuffling, or even chattering).

  - If you feel that you have lost the attention of your audience, slow down, re-energize, provide simpler explanations, and attempt to re-engage the listeners. Under no circumstances is it wise to speed up to get to the end faster. No one will be listening—you might as well sit down there and then.
- **Entertain questions enthusiastically and sympathetically**
  - The key assumption has to be that no questions are off-limits unless the chair intervenes.
  - Insist that questioners state their name and affiliation.
  - Answers should be brief to allow everyone who wishes to participate.
  - Avoid the temptation to use a question to re-start your lecture or to open up a new favorite topic.
  - "I don't know" is a better answer than indiscriminate waffle. You could offer to get back to the questioner once you have established an answer with an expert colleague.
  - Thank your inquisitors for their questions, even if they are aggressive or negative. In the latter cases, it is better to politely restate your messages than to defend fiercely.
  - Do not attempt to answer a question that is based upon emotion with relentless scientific logic. Rather, acknowledge the concern expressed and state what might be done to resolve the issue.
  - It is permissible, in answering a question, to ask the questioner to comment on your answer. This provides another mechanism for engaging your audience.

Follow Up

The relief experienced following successful completion of a presentation can result in unintentional neglect of follow-up actions. These are best tackled immediately following the presentation:

- **Deal with commitments to the organizers**
  - In addition to expressing thanks to the organizers, be sure to provide requested manuscripts—best done when the meeting is fresh in your mind.
- **Fulfil promises to the audience**
  - Be sure to follow up any promises for materials, slides, or information made to members of the audience. Failure to do this can result in losing welcome converts to the chemical sciences.
- **Review your lecture material**
  - It is likely that you will be asked to present a similar lecture in the future. It is a good idea to review and modify your material shortly after the lecture; you will be in a good position to judge what went well, and what did not!

Finally, it is important not to be discouraged by some hostility from your audience. It is unfortunate that many people have little understanding of science. Indeed, some regard it as chic to proudly pronounce their ignorance! Some will have emotional and irrational objections to "chemicals" per se. Although baseless, these can form a deeply held part of a person's values. Just remember that "You cannot reason a person out of a position he did not reason himself into in the first place" (Jonathan Swift). However, human nature is such that almost everyone is on the lecturer's side. They will wish you to do well, and are very forgiving of mistakes, even those that mortify the speaker under the scrutiny of a multitude of pairs of eyes. After all, a good and well-appreciated lecture is a win for both the audience and the speaker.

David A. Evans <dae.jeevans@btopenworld.com> is a member of the IUPAC Committee on Chemistry and Industry. A bio-organic chemist by training, Evans is retired as head of research and technology for Syngenta, AG.

The Eurobachelor: An Update

This brief article updates a feature from the Sep-Oct 2004 CI, p.11, which discussed implementation of the Bologna process <www.iupac.org/publications/ci/2004/2605/3_mitchell.html>.

by Terry Mitchell

In 1999, in Bologna, Italy, 29 European ministers of (higher) education signed the historic Bologna Declaration. Their goal was to put into place by 2010 an open "European Higher Education Area" in which university degrees will be transparent and comparable. Since 1999, the ministers have had several further meetings: The model now consists of three cycles, to be called in many countries Bachelor, Master, and doctoral cycles. The first cycle should last three to four years, the second between one and two. The doctoral cycle will involve three to four years of full-time study. Forty-five countries are now involved, including Russia, so that the emerging European Higher Education Area stretches from the west coast of Ireland all the way to Vladivostok, and from Crete to the Arctic Sea!

Because of these changes, 20 out of 25 OECD countries will soon be offering three-year Bachelor degrees; the U.S. four-year degree is starting to look like the "odd man out," particularly since most of Europe is going for three years, at least in chemistry, joining many British Commonwealth countries like India, Singapore, and Australia.

These new degrees have a credit structure based on the European Credit Transfer and Accumulation System (ECTS), under which graduates will receive a "super-transcript" called the Diploma Supplement. Thus, Bachelor qualifications will carry between 180 and 240 ECTS credits, and Master courses mostly between 90 and 120.

A large-scale university-run project called Tuning Educational Structures in Europe is trying to define the necessary tools for implementation of the "Bologna Process." Within the scope of this project, the European Chemistry Thematic Network (ECTN) has devised a framework for a 180-credit (three-year) Bachelor program in chemistry, which we call the "Chemistry EUROBACHELOR." ECTN is closely linked with the European Association for Chemical and Molecular Sciences [EuCheMS], a group representing over 150 universities and (presently) 12 national chemical societies. In 2004, ECTN took a bold step into accreditation, and, with the support of the SOCRATES program of the European Union, offered interested institutions the possibility of applying for the "Chemistry EUROBACHELOR Label," to be granted initially for five years.

The initial pilot project, which ran until Summer 2006, was extremely successful. Thirty programs were awarded the Label; they came from 20 institutions in 11 countries. And which university got the most Labels? Bologna!

The next step was to develop an accreditation program for Master level programs that would offer a "Euromaster Label." Again, ECTN is being supported in this effort by the EU Commission.

The EUROBACHELOR Label has been "licensed" by three powerful partners: in Germany, the accreditation agency ASIIN <www.asiin.de>, in the UK and Ireland, the Royal Society of Chemistry <www.rsc.org>, and in Italy, the Società Chimica Italiana <www.soc.chim.it>. In the future, these partners will be able to award the Euromaster Label.

To clarify its objectives, ECTN Association has given itself a mission statement:

Our mission is to ensure that the Eurobachelor and Euromaster Labels awarded by ECTNA and its partners set the standards for chemistry higher education in Europe and ensure that Bachelor and Master degrees offered by European higher education institutions are comparable and easily readable as far as skills, competences, and learning outcomes are concerned.

Thus, our goal, and that of our partners, is to facilitate mobility and employability by certifying that institutions do indeed offer comparable degree programs, thus making it easier for graduates to move "without let or hindrance" within Europe. But not only within Europe: We hope that the "Chemistry EUROBACHELOR Label" will in time be accepted worldwide as a visible symbol of the high standard of European university chemistry education.

www.eurobachelor.eu

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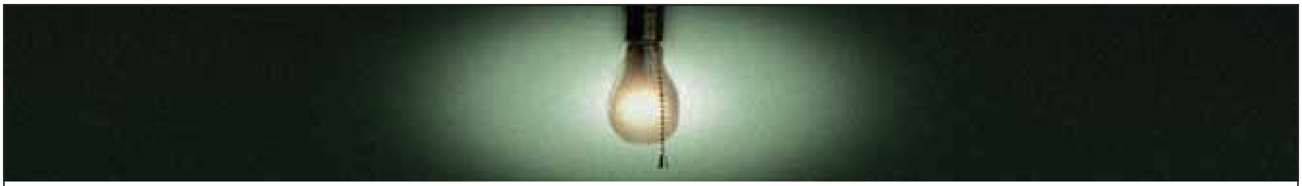
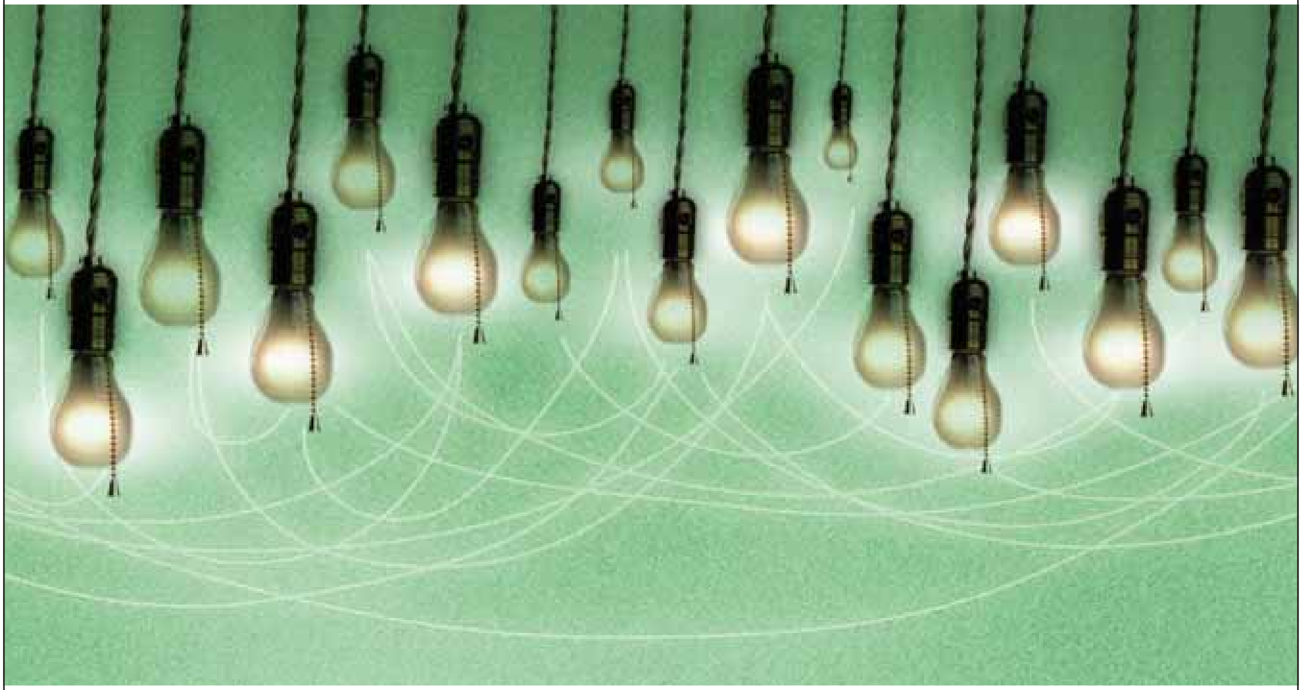




Adjustment, Estimation, and Uses of Equilibrium Reaction Constants in Aqueous Solution

by Vladimir Y. Buzko, Igor V. Sukhno, and Leslie D. Pettit

Environmental scientists, chemical engineers, chemists, and specialists in related fields need software to treat quantitatively the dependence of equilibrium constants and activity coefficients on ionic strength and on the presence of dissolved gases. IUPAC has been actively involved in this problem for many years and is now able to provide several software tools.

In 2006, the project Adjustment, Estimation, and Uses of Equilibrium Reaction Constants in Aqueous Solution <www.iupac.org/projects/2006/2006-010-1-500.html> was initiated as an extension of project 2000-003-1-500, Ionic Strength Corrections for Stability Constants. The aim of this project is to prepare a suite of programs to correct stability constants for ionic strength changes and temperature changes, for the calculation of gas solubilities, for speciation calculations, and for titration simulations.

Overview of the Suite of Programs

The software package (*Aq_Solutions.exe*) for the quantitative treatment of equilibria in solution consists of a suite of programs that will be regularly extended and updated. Currently, the suite of programs includes those developed under project 2000-003-1-500, but these are now being extended. Programs already available include:

SIT: This corrects stability constants for changes in ionic strength using Specific Interaction Theory (SIT) and estimates SIT parameters, with full statistics. It contains an editable database of published SIT parameters. It also provides routines to inter-convert MolaRity (c) and MolaLity (m), and lg K_c and lg K_m values. A version of the SIT program to correct stability constants for changes in seawater salinity and in electrolyte mixtures is currently being tested.

Electrolytes: This calculates electrolyte activity coefficients, osmotic coefficients, and the activity of water for 315 electrolyte solutions using the Pitzer and Lin-Tseng-Lee equations. It also calculates

- ionic activity coefficients using the Millero-Pitzer and Lin-Tseng-Lee methods
- ionic activity coefficients for 77 ions in various electrolyte solutions ($NaClO_4$, KCl, NaCl, etc.) using the Pitzer-Millero method
- ionic activity coefficients for the most important 28 ions in seawater, using the Millero ion pairing model and the Lund-Jonsson -Padersen method

Acid-base: This calculates the composition of acid-base systems at equilibrium in electrolyte solutions and seawater. It also calculates the following:

- equilibrium protonation constants of the 8 most important and widespread inorganic acids, 14 carboxylic acids, 9 aminoacids, 4 nuclotide-5'-phosphoric acids, 10 phenolic compounds, and 5 bio-logically activity organic amines at different salinity (chlorinity) at different temperatures
- the equilibrium molar fractions of free acid and free base ionic forms as a function of pH
- p*K*w values and the H^+ activity coefficient in seawater at different salinity (chlorinity) and tempera-tures using the Culberson-Pytkowicz-Dickson-Riley-Hansson, Millero, Sammartano-De Robertis, and Millero ion pairing models
- H^+ activity coefficients for correction of pa_H to $p[H^+]$ in different ionic media (KBr, KNO_3, KCl, NaCl, $NaClO_4$) at 298 K
- dissociation constants of 28 organic acids at different concentration of background electrolytes (KNO_3, $NaNO_3$, KCl, NaCl) at 18 and 25 °C, using simplified Pitzer theory
- equilibrium molar fraction of free ionic forms of 247 polycarboxylic (mono-, di-, tri-, tetra-) acids and the equilibrium molar fraction of weak complexes of ionic forms of polycarboxylic acids as a function of ion background electrolyte at different pH

The program also helps predict the influence of background electrolyte on thermodynamic protonation constants.

Temperature effects: This calculates and models the thermodynamic properties (lg K°_{298}, ΔH°_{298}, ΔS°_{298}, $\Delta C_p{}^\circ{}_{298}$, $d(\Delta C_p{}^\circ{}_{298})/dT$, $d2(\Delta C_p{}^\circ{}_{298})/dT^2$) from temperature dependence of equilibrium constant using eight thermodynamic equations: Van't Hoff, Isobar, Extended Isobar, Clarke-Glew, Extended Clarke-Grew, DQUANT, Valentiner, and Blandamer-Robertson-Scott equations. It also predicts the temperature dependence of lg *K*. Full statistics are included.

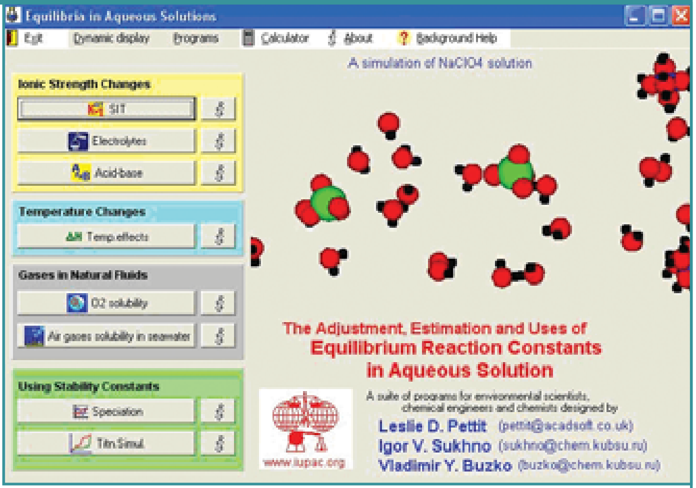
O_2 solubility: This calculates the solubility of gaseous O_2 in pure water at different temperatures, pressures, altitudes, humidities, and for different concentration ranges using Millero experimental data, the Garcia-Gordon equation, and recommended tabular data. It also calculates O_2 solubility in:

- 22 electrolyte solutions at different temperatures, pressures, and concentration ranges
- natural fluids (brines, mine waters, mineralized waters, urine, blood and other physiological media) and artificial fluids (artificial sea water, mixed salt solutions, process liquids) for different ionic compositions at different temperatures, pressures, humidities, and concentration ranges, taking account of the fluid pH
- seawaters over a range of salinities at different temperatures, pressures, humidities, and concentration ranges

It employs three equations to calculate oxygen solubility in seawaters: Garcia-Gordon, Pitzer-Millero (using two artificial seawater standards SSWE) and the ASW Millero polynomial equation derived from Millero experimental data. It uses the Garcia-Gordon equation to predict O_2 solubility in hypersaline waters up to 200 ‰ salinity, over the temperature range 0 to 100°C.

Atmospheric Gas solubility in seawater: A program to calculate air gas (N_2, Ar, CO_2) equilibrium concentrations in pure water and seawaters vs. temperature, pressure, and depth is being tested.

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



A simulation of NaClO4 solution

The Adjustment, Estimation and Uses of
Equilibrium Reaction Constants
in Aqueous Solution

A suite of programs for environmental scientists,
chemical engineers and chemists designed by
Leslie D. Pettit (pettit@acadsoft.co.uk)
Igor V. Sukhno (sukhno@chem.kubsu.ru)
Vladimir Y. Buzko (buzko@chem.kubsu.ru)

Titration simulations: This simulates M-L titration curves in real time and displays speciation dynamically. Species L, HL, H_2L, ML, ML_2, MHL and $MH_{-1}L$ may be included and stability constants adjusted in real time.

Availability

A preliminary version of the programs (a zip file) may be downloaded from <www.iupac.org/projects/2006/2006-010-1-500.html> or from <http://public.kubsu.ru/aquasolsoft>.

Please send comments and suggestions to the authors.

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www.iupac.org/projects/2006/2006-010-1-500.html

The **Tools of the Trade** series, coordinated by Kip Powell, past president of the IUPAC Analytical Chemistry Division, provides a forum for views and discussion on one of the Union's goals: "IUPAC will facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion." If you wish to contribute, please contact <kip.powell@canterbury.ac.nz>.

Resolving Ambiguous Naming for an Ionic Liquid Anion

by Gregory J. Wilson, Anthony F. Hollenkamp, and Anthony G. Pandolfo

The use of clear, concise and unambiguous terminology is essential in conveying scientific information. Nowhere is this more important than in chemistry, where most studies adopt the approach of defining a chemical species, with the corresponding structure, and then proceed to investigate reactivity and/or other intrinsic properties of these species. Chemical nomenclature strives to make the process of definition straightforward, and at the same time it aims to key the results to the literature, by means of a terminology that is based on systematic ordering and naming of functional groups. By and large, the chemical naming system (as recognized by IUPAC) works well. Eventually, however, any system reaches its limits, as we have found in the relatively new literature associated with room-temperature ionic liquids.

While the procedure for naming individual ionic liquids is essentially straightforward (involving a simple combination of cation name with anion name), it happens that one of the anions that is frequently used is one that also challenges the utility of the current naming system as there is no clearly acceptable systematic name. The anion, $[(CF_3SO_2)_2N]^-$, is shown together with its parent protonated form in Figure 1.

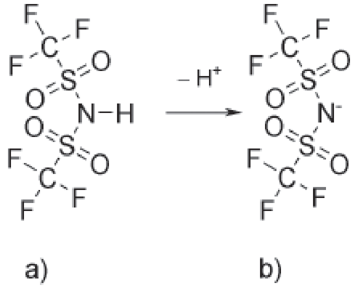

Figure 1. a) the commercial acid trifluoromethanesulfonimide b) its anion.

The acid (Figure 1a) can in fact be named unambiguously, by reference to IUPAC nomenclature, as 1,1,1-trifluoro-*N*-[(trifluoromethyl)sulfonyl]methanesulfonamide.[1] Here, while the approved sulfonamide functionality takes precedence in naming, and therefore simplifies the process, it also ignores the symmetry of the molecule. The latter has clearly been viewed as an unsatisfactory situation in the literature, with the result that most authors refer to the compound (Figure 1a) as some variant of the name originally conferred by Foropoulos and DesMarteau, namely, bis((trifluoromethyl)sulfonyl)imide.[2]

The functional groups pertinent to this discussion are presented in Figure 2. The imide nomenclature extends the analogy between amide and sulfonamide (IUPAC approved) to imide and sulfonimide (or sulfonyl imide) of which only imide is recognized. The symmetry of the molecule also allows commercial suppliers to abbreviate the name to trifluoromethanesulfonimide (CAS number 82113-65-3).

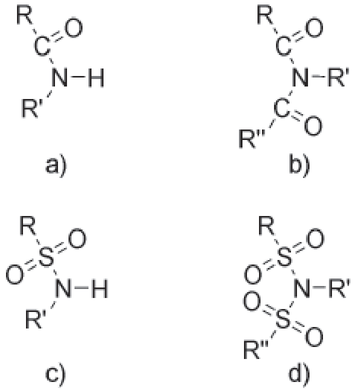

Figure 2. The general form of the functional groups: a) amide, b) imide, c) sulfonamide, d) sulfonimide (sulfonyl imide).

In now seeking to name the anion (Figure 1b), inspection of the literature shows that most authors have been guided by the imide (non-systematic) naming of the parent acid, and have in fact used the imide designation for the anion. This scheme, based on the general use of the -ide suffix to designate negatively charged ionic species, of course gives rise to the inherently confusing situation where both acid and anion (Figures 1a and b) are assigned the same name, with the distinction being based on the chemical context in which the name is used. In addition, the use of trivial names such as bistriflamide[3a] and triflimide[3b] have been used obviously due to structural similarities to the anion $CF_3SO_3^-$, commonly referred to as triflate. However, in the *IUPAC Nomenclature of Organic Compounds* (the "Blue Book") and in the revised provisional recommendations, the now-accepted naming is as an "amide," and it is useful to examine the reasoning that might be used in support of this system.

The amide naming begins with treating the neutral parent molecule (Figure 1a) as an amine, namely bis(trifluoromethanesulfonyl)amine. While this name ignores one of the accepted principles of nomenclature (that the highest order name, in this case "sulfonamide," be assigned), it can be accepted as a synonym under the general directive from IUPAC that ". . . the choice of an appropriate naming method is a function of the substance to be named, and that there may be more than one way of deriving a correct name."[1] There is at least one example in the literature in precedence of this naming scheme, as Haas et al. describe formation of the amide analogue from the parent amine of Figure 1a.[4]

As an amine, there is also recognition of the symmetry of the compound. In the case of the simplest amine, ammonia (Figure 3a), removal of a hydrogen ion (hydron) produces the singly charged anion, NH_2^-, amide (Figure 3b). Removal of a second hydron produces HN^{2-}, imide (Figure 3c). By analogy, the terms amide and imide are allowed for general nomenclature of species such as R_2N^- and RN^{2-}. Thus, Figure 1a depicts a secondary amine in which the trifluoromethanesulfonyl groups are regarded simply as "side-groups," which make no contribution to the functionality that is incorporated into the naming. Accordingly, the anion of Figure 1b is clearly an amide, bis(trifluoromethanesulfonyl)amide—commonly abbreviated to TFSA. A name based on "imide" is not even optional, as imides are, according to this scheme, doubly charged, and can only be derived (practically) from primary amines.

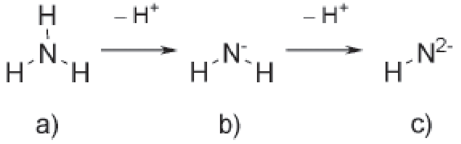

Figure 3. Ion formation by loss of hydrogen from a) ammonia, to give: b) amide; c) imide.

Arguably, the amine–amide naming scheme is an improvement on the imide-imide scheme, as it removes confusion over which species (neutral parent or anion) is being referred to. However, the latter is entrenched in the literature, having taken its place when metal salts of the perfluoroalkanesulfonyl superacids became known as useful reagents.[5] Further, as already noted, both amide and imide are embedded in the organic literature as chemically distinct, though similar looking, functionalities. It is probably a combination of all these factors that now sees the literature, particularly that pertaining to ionic liquids, exhibiting a fair degree of confusion in the naming of the TFSA/I anion.

In light of the fact that amide and imide are well-known functionalities in organic chemistry, IUPAC designates them as *retained* names when they refer to anions, due to their usage in trivial naming, and recommends the use of *azanide* and *azanediide*, which are, respectively, the *preselected* systematic names for the substituted amide and imide anions.[†,6] The use of azanide and azanediide as the parent functional groups should eliminate all possible ambiguity between amides, imides, and their anions. These recommendations were proposed for the nomenclature of hydrides of nitrogen (and their ions) and more recently in the revised *Nomenclature of Inorganic Chemistry*.[7]

Thus, the anion of Figure 1b would have the systematic name of bis(trifluoromethanesulfonyl)azanide, which could still be abbreviated to TFSA. The next member in the series of fluoroalkanesulfonyl anions, shown in Figure 4, would have the systematic name of bis(pentafluoroethanesulfonyl)azanide, abbreviated to PFSA. Until now, the chemical literature has referred to the latter (apparently without exception) as BETI—bis(perfluoroethylsulfonyl)imide.[8] Here, it seems that the naming scheme followed was designed more to produce the acronym than to stabilize an unsteady aspect of chemical nomenclature. As far as we can determine, no one has attempted to name this anion as an amide.

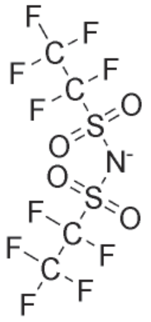

Figure 4. The anion widely known as BETI—bis(perfluoroethylsulfonyl)imide.

One of the factors that has contributed to the uncertainty over the naming of TFSA is limitations in the scope of existing IUPAC rules on nomenclature. There are several functional groups for which the formation of ions has not been considered in detail. An example that illustrates the limitations is the so-called organic acids, where IUPAC only recognizes those where the acidic group is based on a chalcogen atom, and then derives the anion name based on the name of the parent acid. In the present case, however, the anion name that we are directed to use (azanide) is really a broad descriptor (signifying "nitrogen-centred singly-charged anion") which bears no specific link to the protonated form.

Ultimately, we suggest that a more satisfactory naming should be sought for HTFSA and TFSA$^-$. This will first require official recognition of the sulfonyl imide (sulfonimide) functionality, to mirror the already-accepted sulfonamide. Given that the former are all strong acids, and that their conjugate base anions now constitute an important chemical class, it follows that naming of the anions should be linked to that of the parent compounds, as it is for other acid-anion pairs (*vide supra*). Thus, the search should continue for a chemically appropriate, unambiguous way of naming the anionic form of the (putative) sulfonyl imide. To this end, a possible solution can be found in the literature on these compounds. In a 1990 patent,[9] Michel Armand, one of the pioneers in putting TFSA salts to work as electrolytes, labelled this group of anions as "imidides"—literally, anions of imides. Perhaps current agreement on TFSA(azanide) will be a transient on the way to acceptance of TFSI(imidide).

References

† It is also possible to name the anion an aminide, since IUPAC recognizes this for anions derived from amines. However, as discussed, the status of the protonated form as a true amine is questionable. For anions derived from amides, IUPAC recommends the use of azanide.

1. G.J. Leigh, H. Favre, and W.V. Metanomski, *Principles of Chemical Nomenclature: A Guide to IUPAC Recommendations*, ed. G.J. Leigh, Blackwell Science, 1998
2. J. Foropoulos and D.D. DesMarteau, *Inorg. Chem.*, 1984, 23, 3720–3723.
3. a) M.J. Earle, U. Hakala, B.J. McAuley, M. Nieuwenhuyzen, A. Ramani, K.R. Seddon, *Chem. Commun.*, 2004, 1368–1369. b) K. Dhanalakshmi, M. Vaultier, *Tetrahedron*, 2003, **59**, 9907–9911.
4. A. Haas, Ch. Klare, P. Betz, J. Bruckmann, C. Krüger, Y.-H. Tsay and F. Aubke, *Inorg. Chem.* 1996, **35**, 1918–1925.
5. See, for example, K. Mikami, O. Kotera, Y. Motoyama, H. Sakaguchi and M. Maruta, *Synlett*, 1996, 171–172.
6. IUPAC Provisional Recommendations, Preferred IUPAC Nomenclature, September 2004.
7. a) Chatt, J. *Pure Appl. Chem.* 1982, **54**, 2545–2552. b) *Nomenclature of Inorganic Chemistry: IUPAC Recommendations 2005*, ed by N.G. Connelly et al. The Royal Society of Chemistry, 2005.
8. C.G. Barlow, *Electrochem., Solid State Lett.*, 1999, **2**, 362–364.
9. a) M. Armand, World Patent WO 90/03968. b) see also, M. Armand, M. Gauthier, C. Michot and N. Ravet, World Patent WO 99/40025.

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The editor thanks the authors for their contribution to *CI*, and notes that their recommendation does not imply in any way official acceptance by IUPAC. The whole subject of organic nomenclature is currently under revision and will result in a new edition of *Nomenclature of Organic Chemistry* (the "Blue Book"). As Wilson and co-authors point out, current nomenclature does allow for unambiguous names for the species presented in Figure 1, and such problems arise when one wants a system of unique (preferred) names. This complex problem has been worked on by IUPAC project task groups for some time, and new recommendations can be expected in a year or so.

See relevant IUPAC project <www.iupac.org/projects/2001/2001-043-1-800.html>.

IUPAC Wire

News and information on IUPAC, its fellows, and member organizations.
See also www.iupac.org/news

2007 IUPAC Prizes for Young Chemists

On 12 April 2007, IUPAC announced the winners of the 2007 IUPAC Prizes for Young Chemists, awards for the best Ph.D. theses in the chemical sciences as described in 1000-word essays. The five winners are:

- **Deanna D'Alessandro**, James Cook University, Queensland, Australia
- **Euan R. Kay**, University of Edinburgh, United Kingdom
- **Anna Aleksandra Michrowska**, Polish Academy of Sciences, Warsaw
- **Taleb Mokari**, The Hebrew University, Jerusalem, Israel
- **Feng Tao**, Princeton University, New Jersey, USA

The winners will each receive a cash prize of USD 1000 and a free trip to the IUPAC Congress, 5–11 August 2007, in Torino, Italy. Each prizewinner is also invited to present a poster at the IUPAC Congress describing his/her award-winning work and to submit a short critical review on aspects of his/her research topic to be published in *Pure and Applied Chemistry*. The awards will be presented to the winners of the 2006 and 2007 prizes during the Opening Ceremony of the Congress.

The following essays describing the 2007 winners' theses, which cover a wide range of subject matter, can be found on the IUPAC website:

- D'Alessandro, "Stereochemical Effects on Intervalence Charge Transfer"
- Kay, "Mechanized Molecules"
- Michrowska, "Search for New Hoveyda-Grubbs Catalysts and their Application in Metathesis of Alkenes"
- Mokari, "Developing a New Composite of Nanocrystals with Semiconductor-Insulator and Semiconductor-Metal Interfaces"
- Tao, "Nanoscale Surface Chemistry of Organic Layers on Solid Surfaces Formed through Weak Noncovalent Interactions and Strong Chemical Bonds"

There were 57 applications from 24 different countries. The Prize Selection Committee was comprised of members of the IUPAC Bureau with a wide range of expertise in chemistry. The committee was chaired by Leiv K. Sydnes, IUPAC past president.

In view of the many high-quality applications, the committee decided to also give two Honorable Mention awards to:

- **Joshua Goldberger,** University of California, Berkeley, USA
- **Brian H. Northrop,** University of California, Los Angeles, USA

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

Applications for the 2008 Prize are now being solicited, as described on page 31 and on the IUPAC website <www.iupac.org/news/prize.html>.

www.iupac.org/news/prize/2007_winners.html

Election of IUPAC Officers

On 1 January 2008, Bryan Henry (Canada), current president, will become past president and remain an officer and a member of the Bureau for a period of two years; meanwhile Leiv Sydnes (Norway), current past president, will retire.

At its assembly in Torino on 11–12 August 2007, the Council will be asked to elect a president, vice president, secretary general, and treasurer. In addition, there are four vacancies for elected members on the Bureau. Nominations for the various positions that fall vacant at the end of 2007 will have been received by 11 June 2007 (i.e., two months before the start of the 44th IUPAC Council Meeting). Details on the Election of Officers and Bureau Members, including nominations are available online.

www.iupac.org/news/archives/2007/44th_council/elections.html

Highlights of the Executive Committee Meeting

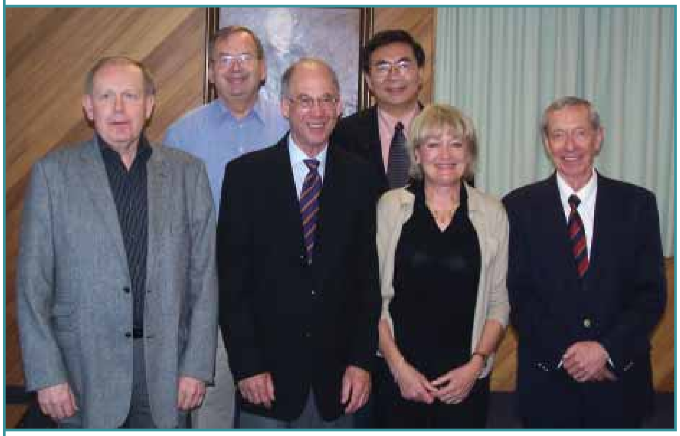
IUPAC's Executive Committee (EC) meets once a year to ensure the orderly discharge of the functions of the Union. In 2007, the EC meeting was held 24–25 March in Wellington, New Zealand. The EC comprises the IUPAC officers, namely the president, past president, secretary general, treasurer, and three elected members, currently Oleg Nefedov, Chunli Bai, and Nicole Moreau. IUPAC Executive Director John Jost acts as secretary.

At the meeting, the EC recommended to the Bureau and Council approval of the following:

- applications for NAO status of Cuba, Ethiopia, and Uruguay
- the proposed change in the NAO for Korea
- application for Associated Organization status of FLAQ, the Federacion Latinoamericana de Asociaciones Químicas

The EC also approved the following:

- a change in the schedule for the 2009 General Assembly (GA) in Glasgow, which calls for holding the Bureau and related meetings at a different time and place
- a change in the schedule in EC and Bureau meetings so that the first EC meeting after a GA would be in the fourth quarter of the same year and the first Bureau meeting after a GA would be in the second quarter of the following year; the Bureau meeting in the GA year would be in the second quarter of the GA year and not during the GA



Executive Committee members in Wellington, New Zealand. Front from left: Leiv Sydnes, Bryan Henry, Nicole Moreau, and David Black; back: Christoph Buxtorf and Chunli Bai.

- a grant of USD 10 000 for the International Chemistry Olympiad to support participation by contestants from less developed countries
- a grant of USD 6000 for the Mendeleev conference to support the participation of chemists from Commonwealth of Independent States countries
- a review of the feasibility of having an International Year of Chemistry

In addition, the EC recommended to the Bureau and Council approval of the budget proposed by the Finance Committee. The proposed budget for 2008-2009 would, as usual be balanced (i.e., net income (expense) equal to zero) with expense/income for the biennium of USD 2 936 100, an increase of USD 189 300 from the budget for the current biennium.

The location of the EC meeting varies each time, which provides officers an opportunity to connect with the NAO hosting the meeting. IUPAC acknowledges the Royal Society of New Zealand for welcoming the EC and for providing facilities for the meeting. In particular, IUPAC thanks Steve Thompson, chief executive officer of the RSNZ, and Eddie Davis, manager of international activities. During the EC meeting, the Kiwis as they called themselves, also arranged for a social gathering with local IUPAC members; among them were Margaret Brimble (University of Auckland, IUPAC Subcommittee on Organic Synthesis), Richard Hartshorn (University of Canterbury, IUPAC Chemical Nomenclature and Structure Representation Division), Laurie Melton (University of Auckland, IUPAC Chemistry and the Environment Division), Kip Powell (University of Canterbury, IUPAC Analytical Chemistry Division), and Jim McQuillan (University of Otago, IUPAC Physical and Biophysical Chemistry Division).

www.iupac.org/news/archives/2007/134_ec.html

ChemZoo Announces the Release of the ChemSpider Service

On 24 March 2007, ChemZoo, Inc. announced the launch of its ChemSpider Service <www.chemspider.com>, an online resource for chemists to search, aggregate, and data mine publicly available chemical data. At the time of its release, over 10 million compounds were indexed in the ChemSpider database including the PubChem collection and data provided by a number of other collaborators. ChemSpider has produced a value-added offering of the publicly available chemical structure databases by adding additional predicted property information generated as a result of its collaborations with property prediction software providers, including Advanced Chemistry Development. By delivering access to an aggregated database collection of over 10 million structures, as well as access to transaction-based predictions of systematic identifiers and physicochemical predictions, ChemSpider hopes to position itself as one of the premier open-access websites for chemists to access information.

www.chemspider.com

Young Ambassadors for Chemistry in Grahamstown, South Africa

The last of the Young Ambassadors for Chemistry (YAC) events was held 19–23 March 2007 in Grahamstown, South Africa, completing a five-year, five-nation, three-continent project intended to train teachers to help students communicate the benefits of chemistry. This last leg of the YAC series was carried out during the SASOL Science Festival (21–27 March), the largest science festival in Southern Africa.

The SASOL SciFest, which attracted around 45 000 people over the week, proved to be the ideal environment for a YAC event. Brian Wilmot, SciFest director, was instrumental in allowing YAC to be part of the festivities. The Science Festival is an annual event, largely sponsored by the South African oil company SASOL with support of many other firms.

Student reporters roved the square in Grahamstown and interviewed the public.

YAC is a partnership between the Public Understanding of Chemistry subcommittee of IUPAC's Committee on Chemistry Education (CCE) and the Science Across the World (SAW) Network created to facilitate the flow of ideas between chemistry and society using young people as mediators. This fifth YAC event built upon the successes of those held earlier in Taipei, Taiwan; Buenos Aires, Argentina; Krasnoyarsk, Russia; and Gwangju, Korea.

A typical YAC event encompasses four days of workshops and preparation with educators, followed by a one-day public event where students—the Young Ambassadors for Chemistry—share their enthusiasm and interest with passers-by. The first stage of the project was the workshop series, held 19–22 March, which is geared towards educators. During these workshops, educators are guided in the use of suitable materials and activities to promote public awareness of chemistry. Ken Ngcoza, Science Education Lecturer at the Science department, Faculty of Education of Rhodes University, hosted the course. "We selected educators from public schools in and around Grahamstown to partake in this workshop series," said Ngcoza.

Students built DNA models piece by piece.

The group included 24 teachers from 10 schools from townships around the region, all graduates from Rhodes University. The teachers came sheepishly to meet the YAC organizers and start the week of workshops.

The week started with official opening speeches by Brian Wilmot (director SciFest), George Euvrard (dean of the Faculty of Education at Rhodes University), Ken Ngcoza, and finally Erica Steenberg, a member of the CCE from the University of the Witwatersrand in Johannesburg, who was the local YAC event contact, organizer, and "troubleshooter."

The goals of the workshops, said Steenberg, were to "show educators productive ways to teach chemistry, build models, prepare chemistry-related advertisements and commercials, set up partnerships in schools, talk about genetics, communicate about chemistry and chemical products, and plan activities for learners."

The third day of training, which involved computer work, proved enlightening for the organizers and participants. In a survey of the group the night before, organizers had asked how many of the participants were happy to work on computers and found that only 6 out of 22 were confident. The workshop was rearranged so that each of the newcomers to internet research would be sitting with an experienced colleague. It turned out that the teachers were being very modest about their abilities and by the end of the morning organizers had created e-mail addresses for those who didn't have one and signed everyone up to the Science Across the World program. This was an impressive result given the absence of internet facilities in these teachers' schools. Thankfully, Ngcoza offered to help the teachers remain connected via the university facilities.

In the afternoon of the third day, participants returned to the classroom to practice the tasks that their students would be undertaking as part of the YAC day in central Grahamstown. First, they built a

three-meter model of DNA from liquorice and jelly tots (from the SAW resource *Talking about Genetics*). Second, they designed, prepared, and presented a line of South African cosmetics, including bath salts, hair gel (for black curly hair), and shampoo (from the SAW resource *Chemistry in Our Lives*).

The teachers' presentations were excellent, but one teacher, named Shakes, stood out and won the BioRad DNA extraction (Genes-in-a-Bottle) kit. His presentation was so dramatic and energetic that he was an easy choice. The group prize was well-fought too, but the traditional award of a piece of Lida Schoen's Dutch cheese was actually shared by everyone in the group.

On the last day before the public event, the organizers were invited to visit a number of schools. With Ngcoza and Steenberg as guides, they visited Victoria High School for Girls (close to Rhodes University in Grahamstown), where they observed a lively quiz competition during a lesson on electricity, Ntsika school, where a senior biology lesson was taking place, and C.M. Vellem School (6–15 year olds), where they met the head teacher. The last two of these schools are located in the nearby township called Joza.

Visiting the schools gave the organizers a reality check. For all they were presenting about YACs, the schools in the township have large classes to deal with, few resources, and little in the way of information and communication technology. However, it proved very motivating to see the energy in the schools and the enthusiasm of the teachers and students.

In the afternoon, the teachers completed the final preparations for the YAC day. This involved preparing the DNA kits, the cosmetics workshops, as well as the tasks for the roving reporters and the bags of gifts from our sponsors for the students. By now, the teachers knew exactly what to do during the public YAC event.

At the end of the afternoon organizers carried out a feedback session. The information from the teachers was insightful and very helpful. One of the main issues concerned the logistics of becoming involved in an internet-based program without any internet access. The last workshop session ended with certificates of recognition for all participants and a lot of kissing and hugging.

On YAC day, Friday 23 March, the sun shone brightly as the students and teachers prepared the chemistry activities to be presented during the public event. Organizers requested 30 students, but around 80 showed up in their smart school uniforms. The event was held in a square in front of the cathedral, right in the town center, which proved to be a perfect venue. The square was decorated with the invitation posters (also scattered over Grahamstown) and the winning posters from the competition "Chemistry for Humanity" <www.iupac.org/publications/ci/2007/2901/1_schoen.html>.

Organizers felt that the Grahamstown YAC event may have been the best public awareness of science event they had ever been a part of. One highlight of the event included perhaps the largest edible DNA model from sweets ever created, which was 12-meters long. (Guinness may like to get in touch!) The 18 TV commercials by students were theatrical and it proved difficult for the judges to choose prize winners. In fact, organizers and teachers ransacked their SciFest visitor's bags (caps and T-shirts) for freebies to have more prizes to offer the students.

In addition, the student reporters did a fantastic job, with excellent leadership from a teacher named Vuks, who briefed and coordinated the students. He had a maximum of 17 student reporters at a time, who asked the public for its opinions regarding chemistry. The effort yielded questionnaires with around 80 complete answers on the three questions:

Question 1: Do you know what the students are doing?

Yes: 46% No: 54%

Question 2: Do you like what the students are doing?

84% 16%

Question 3: "What can you remember of your own chemistry lessons in school?"

This resulted in a variety of answers:

- negative: "chemicals are dangerous"
- theoretical: "mercury is very heavy and sulphur is very yellow" and "I still remember the tests for the gases and most of the Periodic Table"

- practical: “I know that chlorine kills harmful bacteria in water”
- appreciative: “we did not have these kinds of things in our generation, but we are glad for our children”

Conclusion

This last YAC couldn’t have been better: many enthusiastic students, lots of general public, and wonderful weather. Teachers took their own children or proudly posed with their students for the photographer. The headmistress and the science teacher of Ntsika came to watch their students.

There is little, or no, access to computers and the internet in schools in this area, so the organizers need to find a way to connect these teachers to the rest of the world. The MiST (Mathematics, Information and Communication and Technology [ICT], Science) Research Centre at Rhodes University decided to consider the logistics for sustaining the YAC initiative. Ngcoza learned that C.M. Vellem school is involved in the Eyethu ICT initiative, through which they receive computers and internet connectivity to share with the community. It will be ideal to link the YAC South Africa project to this initiative. This school is central to the other schools involved in the workshop.

Steenberg and her colleagues at RADMASTE are looking into the possibility of inviting teachers to YAC workshops and having another YAC event in the future. There is interest in establishing a YAC in Mpumalanga and in Gauteng, which would bring YAC to three of the nine provinces in South Africa.

Acknowledgements

- IUPAC
- Science Across the World <www.scienceacross.org>
- GlaxoSmithKline, the former main sponsor of the Science Across the World program <www.gsk.com>, sent goody bags for all participating teachers and students.
- SASOL Scifest (Brian Wilmot) for a great deal of input during planning, sponsorship of workshop participants’ lunches, and transportation of the students from Joza
- South African Chemical Institute (Mike Booth) and RADMASTE Centre (John Bradley) for sponsoring the course book printing
- RADMASTE Centre for supplying teachers’ files
- Rhodes University, Education Department for hosting the workshops
- MiST (Mathematics, Information and Communication and Technology, Science) Research Centre of Rhodes University, for communicating with IT, writing letters, and contacting schools
- Department of Education, Grahamstown District, for writing a covering letter to ensure that teachers were able to attend the workshops
- Kate Benyon for organizing and booking the YAC Event venue and securing tables to be used for the YAC event near the Cathedral
- Cognis, for donating the detergent, the raw material for production of a shampoo
- BioRad for donating a Genes-in-a-Bottle Kit
- Central Laboratory of the Research Councils in the United Kingdom for donating copies of the *Seeing Science* CD-ROM
- Roche for donating the *Roche Genetics* CD-ROMs
- University of Cambridge, International Examinations, for donating the *Science Support Resources* CD-ROMs

For more information about the YAC project, contact Lida Schoen at <amschoen@xs4all.nl>.

www.iupac.org/projects/2003/2003-055-1-050.html

Principles of Chemical Nomenclature

In light of recent nomenclature developments, a project has been established to produce a new version of the original 1998 book *Principles of Chemical Nomenclature—A Guide to IUPAC Recommendations*. With most of the IUPAC color books recently revised or currently in a state of revision, this project is timely. The *Nomenclature of Inorganic Chemistry* (Red Book) was recently revised and published in 2005. A new edition of the *Nomenclature of Organic Compounds*, including preferred names, (Blue Book) is being worked on and is expected for 2008. And a revised edition of the compendium of *Macromolecular Terminology and Nomenclature* (Purple Book) is also being finalized.

The original book was aimed at pre-university and first-year university students and their teachers, and the new version will have a similar audience. However, it is intended to widen the scope a little, to include more biochemical nomenclature, more organometallic nomenclature, and some treatment of Preferred IUPAC Names (PINs) and the IUPAC International Chemical Identifier (InChI).

G.J. Leigh will be general editor; a writer and reviewer will contribute to each main section. Much of the material and the format of the original version will be retained. Chapters assignments are as follows: introductory chapters will be written by G.J. Leigh and reviewed by N.G. Connelly; inorganic chapters will be written by R. Hartshorn and reviewed by T. Damhus;

organic chapters will be written by H. Favre and reviewed by J. Nytrai; organometallic chapters will be written by A. Hutton and reviewed by E. Nordlander; macromolecular chapters will be written by M. Hess and reviewed by J. Kahovec; biochemical chapters will be written by G.P. Moss and reviewed by H.B.F. Dixon; and PINs/InChI will be written by A.D. McNaught and reviewed by S. Heller.

For more information and comments, contact the Task Group Chair G. Jeffery Leigh <jeffery.leigh@sky.com>.

www.iupac.org/projects/2006/2006-029-1-800.html

Metal-Focussed –omics: Guidelines for Terminology and Critical Evaluation of Analytical Approaches

Bioinorganic analytical chemistry is a rapidly developing discipline at the interface of trace element analysis and analytical biochemistry, which targets the detection, quantitation, identification, and characterization of complexes of metals (metalloids) with molecules of natural origin (biomolecules) by hyphenated (coupled) techniques (*PAC*, 1999, 71, 899–917). The advances of trace element analysis in life sciences resulted in the proliferation of new terms related to the description of metal-interactions with biomolecules. Examples of these terms include metallome, ionome, metalloproteome, metallogenome, metallometabolome, heteroatom-tagged proteome, single element proteomes (ex. selenoproteome), and the corresponding *–omics*. The terms are being coined by various disciplines, and the lack of communication among them results in the growing confusion. All terms are very recent and have not been considered in the *Guidelines for Terms Related to Chemical Speciation Analysis* published in *PAC* 2000, 72, 1453–1470.

In addition to the confusion in terminology, the methodological approaches are proper to each individual discipline. They have all the characteristics to be complementary, but in practice they are carried out independently, with no communication channels among the communities. The project participants intend to conduct a critical analysis of these approaches, of the information they produce, and of the validity of data obtained. The project targets the speciation analysis community organized around the European Virtual Institute of Speciation Analysis <www.speciation.net>, structural genomic consortia, clinical biochemistry, medicine and health sciences communities (characterization of metal-related diseases and related areas, heteroatom-containing species as new clinical biomarkers), nutrition and metabolic sciences (molecular targets of metal binding for essential nutrients and toxic metals), and environmental toxicology (toxic metals in life-sciences and their environmental effects). It should be of interest to regulatory bodies answering the question of what valid information can be obtained in a quantitative and routine way in the metal-related –omics areas.

For more information and comments, contact the Task Group Chair Ryszard Lobinski <Ryszard.Lobinski@univ-pau.fr>.

www.iupac.org/projects/2006/2006-037-1-500.html

Altered Crop Protection Agent Residues in Transgenic Crops

Since the first large-scale commercial introduction of transgenic crops in 1996, the area cultivated with transgenic crops has increased continually, amounting to 102 million hectares worldwide in 2006. Most of the cultivated area is concentrated in the USA, followed by countries like Argentina, Brazil, Canada, Paraguay, China, India, and South Africa, in which the predominant transgenic crops for sale include soybean, maize, cotton, oilseed rape, and potato.

The two most prevalent traits linked with these crops, which are of environmental importance, are herbicide and insect resistance. Herbicide resistance greatly improves weed management and control, allowing herbicides (weed killers) to be applied “over the top” of the crop, eliminating the need for frequent and directed herbicide sprays between crop plants or mechanical removal of weeds. Many insect-resistant transgenic crops contain insect-killing proteins obtained from the soil bacterium *Bacillus thuringiensis*, which are toxic to certain insect species, but not to humans and domestic animals.

Both herbicide and insect resistance traits are likely to affect the nature and quantities of the applied pesticides. This can take the form of increased usage due to over-the-top application of herbicides on the transgenic crop, or of substitution or omission of other pesticides, as discussed in an ongoing IUPAC project (2001-024-2-600), which also considers the possible consequences of these changes on the environment.

The current project extends upon the previous project by considering the impact of transgenic crops on the use of pesticides and the level of pesticide residues on these crops, in particular. It is assumed that, in addition to the substitution of other pesticides that would otherwise have been applied and the change in the level of pesticide residues within a crop, the type of the transformed compounds of the applied pesticides may also differ. Further, besides the direct effects of pesticide application on transgenic crops, some indirect effects may also occur. Under normal practices, specific herbicides may serve as pre-harvest desiccants (i.e., agents that kill the green parts of the crops so that the harvest of seed or stolons is facilitated), while in the case of a herbicide-resistance trait, another chemical may be required for that purpose. This may lead to accumulation of chemical residues in the environment and also to dietary exposure of consumers to agrochemicals.

Thus, the introduction of transgenic crops and the altered nature and levels of residues of pesticides may also necessitate changing the regulatory Maximum Residue Limit (MRL) for a given pesticide in a particular crop. This, in turn, will have potential consequences for the international harmonization of MRLs, which is necessary for international trade and the movement of crop commodities.

These and other related issues, such as the risk assessment and risk management by authorities, will be considered by the proposed project on the evaluation of food and feed safety implications of (altered) residues of pesticides applied to transgenic crops. The project aims to use a coordinated approach, integrating the available information into a critical review of the potential technical, regulatory, and social implications linked with altered residues in transgenic crops.

The three-year project will be conducted by a team from IUPAC's Division VI—Chemistry and the Environment. It will be led by Gijs Kleter and composed of Irene B. de Alleluia, Kevin Bodnaruk, Elizabeth Carazo, Caroline A Harris, Arata Katayama, Baruch Rubin, Yehuda Shevah, Gerry R. Stephenson, Carmen Tiu, and John Unsworth.

For more information and comments, contact the Task Group Chair Gijs A. Kleter <gijs.kleter@wur.nl>.

www.iupac.org/projects/2006/2006-015-3-600.html

Provisional Recommendations

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

www.iupac.org/reports/provisional

Glossary of Terms Related to Kinetics, Thermodynamics and Mechanisms of Polymerization

This document presents recommended definitions of basic terms related to polymerization processes, principally to the kinetics, thermodynamics, and mechanisms of polymerization.

Comments by 31 July 2007
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www.iupac.org/reports/provisional/abstract07/moad_310707.html

Glossary of Terms Related to Solubility

This glossary defines 151 terms used to describe solubility and related phenomena. The definitions are consistent with one another and with IUPAC recommendations for terminology and nomenclature.

Comments by 31 July 2007
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www.iupac.org/reports/provisional/abstract07/shaw_310707.html

Making an imPACt

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

Glossary of Terms Used in Photochemistry, 3rd edition (IUPAC Recommendations 2006)

S.E. Braslavsky

Pure and Applied Chemistry
Vol. 79, No. 3, pp. 293–465, 2007
doi:10.1351/pac200779030293

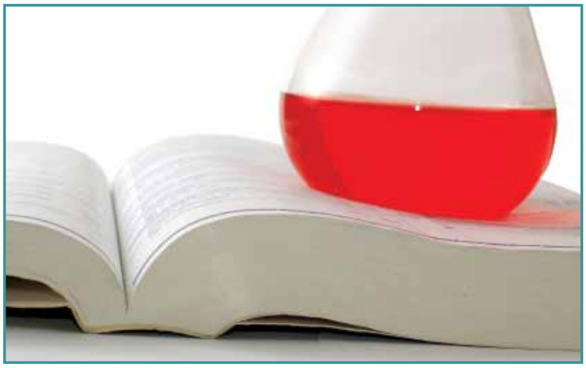
This third edition of the *Glossary of Terms Used in Photochemistry* incorporates revisions and introduces additional terms related to organic photochemical reactions; terms in the area of molecular anisotropy; the use of polarized ultraviolet, visible, or infrared radiation; and nonlinear optical techniques; as well as the emerging field of computation of excited species. Some changes have been introduced regarding terms related to radiation energy to make this collection fully compatible with internationally agreed-upon terms. Links are included to various web pages listing quantities relevant to the work of photochemists and related to the terms included in this document.

This glossary will continue to provide definitions of terms and symbols commonly used in the field of photochemistry in order to achieve consensus on the adoption of some definitions and on the abandonment of inadequate terms. The Subcommittee on Photochemistry of the IUPAC Organic and Biomolecular Chemistry Division emphasizes that it is not the purpose of this compilation to impose terms or rules that would hinder the freedom of choice in the use of terminology. Photochemistry is an interdisciplinary area of science, which involves, in addition to chemistry, such different fields as laser technology, nano-technology, spectroscopy, polymer science, solid-state physics, biology, and medicine, among others. For this reason, it has been necessary to reach compromises and, in some cases, to include alternative definitions used in different scientific fields. It is also important to recognize that this glossary is not intended to replace the textbooks and compilations in which the various complex aspects related to photochemistry have been handled. The general criterion adopted for the inclusion of a term has been: (i) its wide use in the present or past literature and (ii) ambiguity or uncertainty in its usage.

The first edition of the *Glossary of Terms Used in Photochemistry* was prepared for publication in 1988 and has been incorporated into the *Handbook of Organic Photochemistry* and into *Photochromism: Molecules and Systems*. The second edition of the glossary published in 1996 corrected some minor mistakes in the first and was expanded especially to incorporate terms related to (photoinduced) electron-transfer processes. Major photochemistry and photobiology journals have since adopted the glossary as a guideline. The Photochemical Societies have posted the electronic version of the glossary on their web home pages.

The authors welcome suggestions for improving and updating the glossary.

www.iupac.org/publications/pac/2007/7903/7903x0293.html



Chemical Speciation of Environmentally Significant Metals with Inorganic Ligands Part 2: The Cu^{2+}-OH$^-$, Cl$^-$, CO$_3^{2-}$, SO$_4^{2-}$, and PO$_4^{3-}$ Systems (IUPAC Technical Report)

Kipton J. Powell, Paul L. Brown, Robert H. Byrne, Tamas Gajda, Glenn Hefter, Staffan Sjöberg, and Hans Wanner

Pure and Applied Chemistry
Vol. 79, No. 5, pp. 895–950, 2007
doi:10.1351/pac200779050895

Complex formation between Cu^{II} and the common environmental ligands Cl$^-$, OH$^-$, CO$_3^{2-}$, SO$_4^{2-}$, and PO$_4^{3-}$ can have a significant effect on Cu^{II} speciation in natural waters with low concentrations of organic matter. Copper(II) complexes are labile, so the Cu^{II} distribution among these inorganic ligands can be estimated by numerical modeling if reliable values for the relevant stability (formation) constants are available. This paper provides a critical review of such constants and related thermodynamic data. It recommends values of $\log_{10}\beta_{p,q,r}^{\circ}$ valid at $I_m = 0$ mol kg^{-1} and 25 °C (298.15 K), along with the equations and specific ion interaction coefficients required to calculate $\log_{10}\beta_{p,q,r}$ values at higher ionic strengths. Some values for reaction enthalpies, $\Delta_r H_m$, are also reported where available. In weakly acidic fresh-water systems, in the absence of organic ligands, Cu^{II} speciation is dominated by the species Cu^{2+}(aq), with $CuSO_4$(aq) as a minor species. In seawater, it is dominated by $CuCO_3$(aq), with $Cu(OH)^+$, Cu^{2+}(aq), $CuCl^+$, $Cu(CO_3)OH^-$, $Cu(OH)_2$(aq), and $Cu(CO_3)_2^{2-}$ as minor species. In weakly acidic saline systems, it is dominated by Cu^{2+}(aq) and $CuCl^+$, with $CuSO_4$(aq) and $CuCl_2$(aq) as minor species.

Future parts of this series are in preparation—see details of IUPAC project 1999-050-1-500 <www.iupac.org/projects/1999/1999-050-1-500.html>.

www.iupac.org/publications/pac/2007/7905/7905x0895.html

Properties and Units in the Clinical Laboratory Sciences Part XX. Properties and Units in Clinical and Environmental Human Toxicology (IUPAC Technical Report)

John Duffus, Ivan Bruunshuus, Rita Cornelis, René Dybkær, Monica Nordberg, and Wolf Kuelpman

Pure and Applied Chemistry
Vol. 79, No. 1, pp. 87–152, 2007
doi:10.1351/pac200779010087

This document describes the introduction of the concept of property in the field of clinical and environmental human toxicology for the presentation of results from clinical laboratory investigations. It follows the IFCC-IUPAC systematic terminological rules and attempts to create a common base for communication among the clinical chemist, medical practitioner, human toxicologist, and environmental toxicologist.

The term that designates a substance as a toxicant may be an international nonproprietary name, a generic name, a registered trade name, a fantasy name, or other. This causes difficulties in transmitting requests and reports on properties involving substances in biological fluids and environmental media to and from laboratories, to the end user, and in the collating of this information from different sources.

This document comprises a list of properties of human and environmental systems involving toxicants for use in transmitting medical laboratory data. The document recommends terms based on the format developed by the IFCC and IUPAC to facilitate interaction between disciplines and unambiguous interpretation of data (e.g., for purposes of risk interpretation). Systematic terms are presented together with a code (identified by the letters NPU) for each.

The complete CNPU Database may be found at <http://dior.imt.liu.se/cnpu/info.htm>.

www.iupac.org/publications/pac/2007/7901/7901x0087.html

Guidelines for Potentiometric Measurements in Suspensions

Srecko F. Oman, M. Filomena Camões, Kipton J. Powell, Raj Rajagopalan, and Petra Spitzer

Part A. The Suspension Effect (IUPAC Technical Report)
Pure and Applied Chemistry
Vol. 79, No. 1, pp. 67–79, 2007
doi:10.1351/pac200779010067

Part B. Guidelines for Practical pH Measurements in Soil Suspensions (IUPAC Recommendations 2006)
Pure and Applied Chemistry
Vol. 79, No. 1, pp. 81–86, 2007
doi:10.1351/pac200779010081

An explanation of the origin and interpretation of the suspension effect (SE) is presented in accordance with "pH Measurement: IUPAC Recommendations 2002" [*Pure Appl. Chem.* **74**, 2169 (2002)]. It is based on an analysis of detailed schemes of suspension potentiometric cells and confirmed with experimental results. Historically, the term "suspension effect" evolved during attempts to determine electrochemically the thermodynamically defined activity of H^+ (aq) in suspensions. The experimental SE arises also in determining other pIon values, analogous to pH values.

The SE relates to the observation that for the potential generated when a pair of electrodes (e.g., reference electrode (RE) and glass electrode) is placed in a suspension, the measured cell voltage is different from that measured when they are both placed in the separate equilibrium solution (eqs). The SE is defined here as the sum of (1) the difference between the mixed potential of the indicator electrode (IE) in a suspension and the IE potential placed in the separated eqs; and (2) the anomalous liquid junction potential of the RE placed in the suspension. It is not the consequence of a boundary potential between the sediment and its eqs in the suspension potentiometric cells as is stated in the current definition of the SE.

Within Part A the measured cell potentials for suspension potentiometric cells are interpreted and explained in detail. With some former disagreements among investigations clarified, a new unambiguous operational definition of the SE is presented in Part B. It is defined as the difference in cell potential for two suspension potentiometric cells, one with both electrodes in the separated eqs and the other with both electrodes in the sediment or suspension. This potential difference is the sum of the change in the IE potential and the change in the liquid junction potential of the RE, when the electrodes are used for measurement, once in the sediment of the suspension and then in its eqs.

www.iupac.org/publications/pac/2007/7901/7901x0067.html

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For its journal *Pure and Applied Chemistry* (*PAC*), IUPAC has been depositing DOIs (digital object identifiers) to CrossRef since January 2005. However, since January 2007, *PAC* has been participating in full by also offering outbound linking using the DOIs received from CrossRef. These are links added to each reference published in each paper published in *PAC*. This way, papers that have cited a specific *PAC* paper can more easily link to that specific paper on the *PAC* website, but also papers published in *PAC* become more useful resources by offering links to cited references.

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

More about CrossRef, see <www.crossref.org>

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Bookworm

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Natural Products and Biodiversity

Pure and Applied Chemistry
Special issue, Vol. 79, No. 4, pp. 467–823 (2007)

This special topic issue includes reviews and research papers based on lectures presented at the 25th International Symposium on Chemistry of Natural Products (ISCNP-25) and the 5th International Conference on Biodiversity (ICOB-5), held jointly in Kyoto, Japan, 23–28 July 2006, on the theme of natural products. For a conference report, see Jan-Feb 2007 *CI*, p. 29.

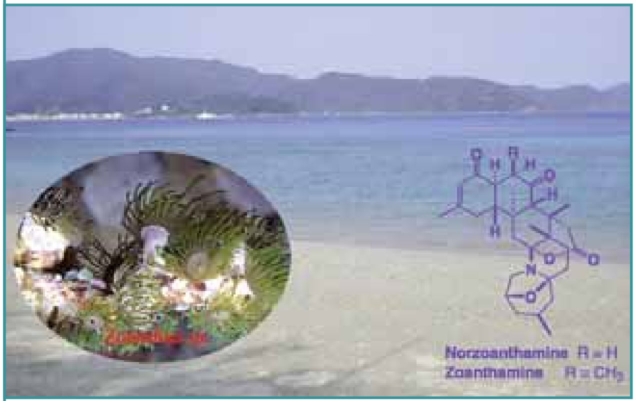
The natural products theme is deeply rooted in the culture of IUPAC. The first International Symposium on the Chemistry of Natural Products (ISCNP), held 15–25 August 1960, with Sir Alexander Todd (later, Lord Todd) as president, can claim particular credit in the history of the Union. Not only did it take an early bold step toward the truly global reach that characterizes IUPAC conferences in the modern era, but it was the harbinger of numerous sponsored or Union-initiated series devoted to other areas of specialization in the chemical sciences.

International delegates to the inaugural event undertook the then nontrivial journey to Melbourne, Canberra, and Sydney, Australia with an excursion to New Guinea, to participate in a scientific program in which structural elucidation and synthesis were dominant themes, and most familiar modern tools and techniques were still in their infancy. Natural products lore still celebrates the names of certain pioneers who contributed to that first program.

What is a *PAC* Special Topic issue?

The concept was introduced as a device to publicize and promote new and emerging principles and practice in all branches of chemical sciences, through the pages of *PAC*. Themes may be selected from inaugural events or special IUPAC projects, but equally, may identify themselves as dynamic and widely practiced areas of science presently covered by regular IUPAC-sponsored series. Important criteria obviously include relevance, topicality, and readership expectations. Publication projects arising from the Special Topics initiative generally continue to achieve favorable citation profiles, and thereby support the view that they fulfill an important need.

www.iupac.org/publications/pac



The background illustration depicts Amamioshima Island, Japan, nearby the marine site of a Zoanthus *species in which D. Uemera (chairman of the ISCNP-25/ICOB-5 Organizing Committee) discovered norzoanthamine in 1995. The total syntheses of norzoanthamineand zoanthamine are reported by M. Miyashita in that* PAC *issue, p. 651.*

As a series, this hardy biennial has since been hosted throughout the world, and has faithfully served a huge international community of scientists engaged in every conceivable aspect of natural products chemistry. The terms of reference for the ISCNP series have recently been adapted following a decision to merge with the younger series of International Conferences on Biodiversity (ICOB). This step was inaugurated with ISCNP-24/ICOB-4, which was held in New Delhi, India, from 26–31 January 2004. The change exemplifies the evolving nature of the subject, and its ongoing appeal to scientists engaged in exploring and developing less familiar disciplinary interfaces, as well as traditional mainstream areas. It is thus unsurprising that natural products should be a Special Topic theme for a second time in the recent history of *Pure and Applied Chemistry* (*PAC*); see *PAC* Vol. 75, No. 2–3, pp. 141–419 (2003), for a collection of papers based upon presentations at ISCNP-23, held in Florence, Italy, from 28 July–2 August 2002. That program featured fresh insights into proteomics, genetics, and molecular biology, a trend that ISCNP-25/ICOB-5 has continued to develop. The program also covered related and new features of bioactivity at the molecular level and chemical biological themes, whilst also paying homage to enduring favorites such as structure and synthesis.

It is noteworthy that the Kyoto meeting represents the third occasion that the series has been hosted in Japan, the home of some quite extraordinary manifestations of natural products and biodiversity, as well as some of the outstanding practitioners of the subject. The program of ISCNP-25/ICOB-5 rightly captures some of this local character, but is also a fully representative expression of the international participation and appeal that traditionally characterizes the series. It is a pleasure to acknowledge the able and enthusiastic support of the conference editor, Hideo Kigoshi, in preparing this Special Topic issue of 27 topical papers based upon program presentations. The collection aspires to offer an enduring archival record of a subject that continues to reinvent itself, and to astound and challenge its practitioners with the apparently boundless molecular riches of the biosphere.

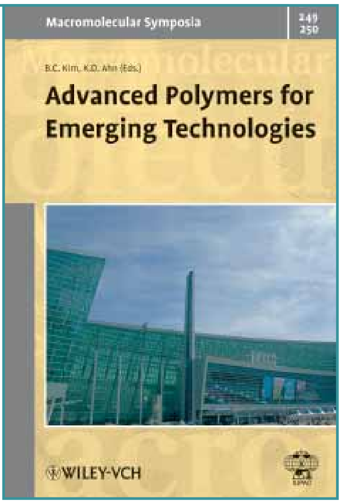
Foreword by James R. Bull, PAC scientific editor
Preface by Daisuke Uemura, chairman of the conference organizing committee

www.iupac.org/publications/pac/2007/7904

Advanced Polymers for Emerging Technologies

B.C. Kim and K.D. Ahn, editors
Macromolecular Symposia, Vol. 249/250
Wiley-VCH, 2007, pp. 1–667

Polymers are very versatile materials whose properties and functionalities can be easily manipulated. Owing to these advantages, polymers are finding new applications in electronic, photonic, biomedical, and energy industries. The desired properties of polymers may be obtained through various methods: by designing new polymer molecules and molecular architecture, by blending or hybridizing with other functional materials, and by regulating micro-and nano-structures by adopting specialized processing techniques.

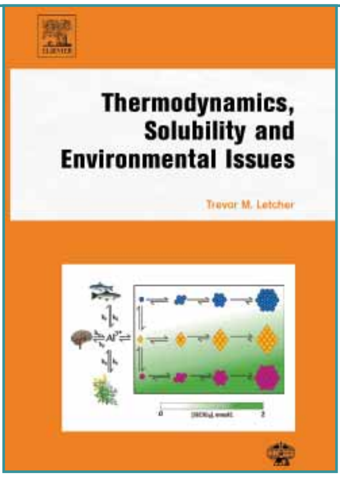


This issue collects many of the research papers presented at the Advanced Polymers for Emerging Technologies symposium that took place in Busan, South Korea, 10–13 October 2006. The first volume offers some innovative ideas for future specialty polymers and the second volume provides solutions to problems frequently encountered in the polymer industry.

www.iupac.org/publications/macro/2007/249_preface.html

Thermodynamics, Solubility and Environmental Issues

Trevor M. Letcher (ed.)
Elsevier, 2007
[ISBN-13: 978-0-444-52707-3;
ISBN-10: 0-444-52707-9]



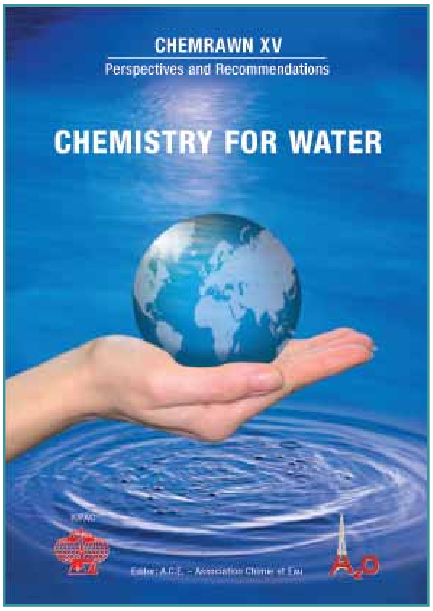
Environmental problems are becoming an important aspect of our lives as industries grow apace with populations throughout the world. *Thermodynamics, Solubility and Environmental Issues* highlights some of the problems and shows how chemistry can help to reduce them. The unifying theme is solubility—the most basic and important of thermodynamic properties. This informative book looks at the importance and applications of solubility and thermodynamics, in understanding and in reducing chemical pollution in the environment.

Written by experts in their respective fields, the book represents the latest findings in this very important and broad area. A collection of 25 chapters cover a wide range of topics, including mining, polymer manufacture and applications, radioactive wastes, industries in general, agro-chemicals, soil pollution and biology, together with the basic theory of, and recent developments in, the modeling of environmental pollutants. This reference is suitable for consultants, industrial/local authority scientists, researchers, and graduate and post-graduate students.

www.iupac.org/publications/books/author/letcher07b.html

Chemistry for Water—CHEMRAWN XV Perspectives and Recommendations

Edited by A.C.E.—Association Chimie et Eau, 2006



The mounting problems of water management around the world, exacerbated by an ever-growing population and equally increasing vital needs, coupled with a finite natural resource, demand concrete, collective, and strategic actions that chemists are ready to undertake, over and above meetings and debates. Using various examples, the CHEMRAWN XV Conference—International Conference on Chemistry for Water shed new light on the huge, often unsuspected, potential of the chemistry disciplines to help solve numerous water-related problems. Plenary Lectures and Perspectives from that pathbreaking conference, held in Paris, France, 21–23 June 2004, have been compiled in this book.

The possibilities envisioned by CHEMRAWN XV imply an asserted will to share the expected progress of a more proactive, more confident, and more united development model. Precautionary principle and sustainable development can only be truly meaningful if they are applied to actual facts. The CHEMRAWN XV Conference set out these realities together with analyses that underline the need for research strategies with a wider multidisciplinary approach. New technologies are urgently needed that can protect reserves of pure water more effectively, create new resources, optimize the various uses of water, and treat effluents efficiently.

CHEMRAWN XV highlighted the emergence of chemistry as an essential component of sustainable development. This new chemistry implies more science, more technology, more innovation, and more solidarity. It requires the simultaneous combination of basic research, technological research, environmental research and sociological research within strategies centered on major objectives such as water.

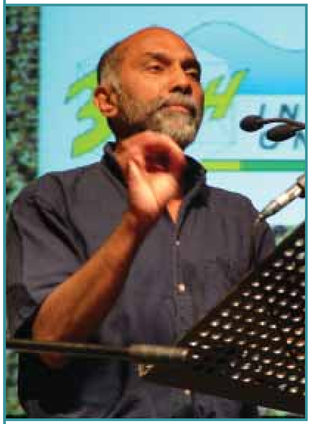
www.iupac.org/publications/books/author/ACE06.html

Coordination Chemistry

by Klaus R. Koch

The **37th International Coordination Chemistry Conference (37th ICCC)** was held 13–18 August 2006 at the new, centrally located Cape Town International Convention Centre in Cape Town, South Africa. This was indeed a historic occasion in the scientific development of coordination chemistry in South Africa, as it represents the first time in the more than 50-year history of the ICCC series that such an important event was hosted on African soil. This event was the culmination of an 18-year bidding process, which started at the 26th ICCC held in Porto, Portugal, in 1988, followed by the virtually unanimous selection of Cape Town as the venue for the 37th ICCC at the Executive Planning Committee in Florence in 1998.

On behalf of the local ICCC organizing committee, I am pleased to report that the 37th ICCC held in Cape Town, despite the somewhat unpredictable Cape winter weather, was by all accounts a great success, as confirmed by the many positive messages from delegates and participants we received.



A.P. De Silva during his opening ceremony lecture.

The 37th ICCC attracted 630 registered delegates from 57 countries across the globe, resulting in an exciting and stimulating scientific program consisting of seven plenary lectures presented by world-renowned coordination chemists A.P. de Silva (Northern Ireland, UK), P. Sadler (UK), H. M. Marques (South Africa), T. Marks (USA), R. van Eldik (Germany), D. Kurth (Germany), and R. Grubbs (USA, and 2005 Nobel Laureate).

The program consisted additionally of 47 keynote speakers and 215 oral contributions, together with 321 poster sessions reporting on the following new and exciting coordination chemistry themes: Metals in Biology and Medicine, Metals in Materials, Nanostructures and Devices, Metals in Catalysis and Industry, Metals in Self-Assembly and Supramolecular Structures, Metal Complexes in Solution, Structure Mechanism and Ligand Design, and Precious Metal Complexes and Photochemistry. Plenary and keynote lectures are being published as a special issue of *Coordination Chemistry Reviews*, edited by Barry Lever with Alan Hutton as guest editor (doi:10.1016/j.ccr.2007.04.019).

Of the 321 poster presentations, 10 produced by young participants were selected to receive poster prizes: K.A. de Villiers (South Africa), N. Mitic (Australia), G.J. Halder (Australia), N. O' Reilly (Belfast, Northern Ireland), T. Quintus (Scotland), A. Pichon (Belfast, Northern Ireland), J. Zampese (New Zealand), T. Schweitzer (Germany), G. Venter (South Africa) and M. Burger (South Africa). Once again, congratulations to these outstanding contributions, they confirm that coordination chemistry is not only alive and well, but thriving.

In an effort to broaden public understanding, and the development, of fundamental science and technology so vital to progress on the African continent, the Organizing Committee tried something new in 2006. It invited 150 pupils and their science teachers from 30 local high-schools to the formal Opening Ceremony, which was followed by a public lecture by an eminent speaker. The students were first treated to an exciting chemistry demonstration by Peter Sadler and Rudi van Eldik, which was enthusiastically received, followed by an outstanding lecture by A.P. de Silva, who kept delegates, VIPs, pupils, teachers, and guests alike spellbound with an address on “Messages from Molecules.” This turned out to be an outstanding success, judging by the feedback from local science teachers who participated. Immediately after the opening ceremony, the Royal Society of South Africa’s annual science essay prizes were also awarded to the student winners.

The formal opening ceremony featured addresses by Helen Zille, mayor of Cape Town, and M. Mangena, minister of science and technology, which underlined the importance the South African government attaches to the development of science and technology.

The success of the 37th ICCC was the result of almost four years of careful planning and much hard work by a team of outstandingly dedicated individuals in the organizing committee. In my capacity as conference convener and chairman of the organizing committee, I want to acknowledge the outstanding team that made the 37th ICCC a reality.

Arranging an event such as the ICCC would not be possible without financial sponsorship, and for the 37th ICCC this was no exception. In view of the high

Mayor of Cape Town Helen Zille (right), Minister of Science and Technology M. Mangena (center), and Klaus Koch, chairman of the organizing committee, at the opening event.

cost of long-distance international travel to South Africa, we were disappointed that the number of international delegates was not as high as we had hoped. Nevertheless with a final number of 630 registered delegates (of which 191 were students), together with the generous sponsorship we managed to obtain, financially the 37th ICCC just broke even. The largest portion of sponsorship funds were used to support 191 student registration fees, which were set at 48 percent of the early-bird registration fee.

Sponsorships and loans from the following organisations were essential to the conference's success: the Department of Science and Technology, the National Research Foundation, University of Stellenbosch, University of the Western Cape, Cape Peninsula University of Technology University of Cape Town, University of the Orange Free State, Anglo American Platinum Corporation Limited, Anglo American Research, AngloGold Ashanti, Anglo American Chairman's Fund Sasol, Sigma-Aldrich, Bruker Biospin, Elsevier, Royal Society of South Africa, South African Chemical Institute and IUPAC.

The 38th International Conference on Coordination Chemistry will be held in Jerusalem, Israel, 20–25 July 2008; see website for update <www.kenes.com/iccc38>.

Klaus R Koch <KRK@sun.ac.za> was the 37th ICCC conference convener and chairman of organizing committee. He is a professor in the Department of Chemistry and Polymer Science at the Stellenbosch University in South Africa.

IUPAC provided financial support to this event through its program for conferences held in scientifically emerging regions. Read more at <www.iupac.org/symposia/support.html>.

Polymers for Advanced Applications

by Ronald D. Sanderson and Aneli Fourie

This **UNESCO/IUPAC Conference on Macromolecules**, held 20–23 November 2006 in Stellenbosch, South Africa, was the 9th in a series of annual conferences. The organizing committee comprised B. Klumperman (Eindhoven University, The Netherlands), R.D. Sanderson (UNESCO Associated Centre for Macromolecules and Materials, Chemistry & Polymer Science Division, University of Stellenbosch, South Africa), T. Davis (The University of New South Wales, Australia), and Aneli Fourie (UNESCO Associated Centre for Macromolecules and Materials).

A satisfactory number of delegates (129) participated, representing 15 countries other than South Africa: Australia, Botswana, France, Germany, India, Iraq, Iran, Japan, Korea, Malaysia, United Kingdom, USA, The Netherlands, Turkey, and Zimbabwe. The total number of students who participated was 77.

The conference featured 32 presentations (6 plenary lectures, 8 invited talks, and 18 oral submissions) by experts who discussed the state of the art in various fields, often encompassing the last few years of research. A lively poster session, featuring 31 posters, proved especially popular for student presentations. Three IUPAC Poster Prizes were awarded to the following students:

- H.S. Abbo (University of the Western Cape, South Africa), "Ethylene Polymerization Using Pyridine-Pyrazolyl Ligand Late Transition Metal Complexes as Precursors"
- A. Bowes (University of Stellenbosch, South Africa), "A-B and A-B-A Type Butyl Acrylate and Styrene Block Copolymers via RAFT-Mediated Mini-Emulsion Polymerization"
- R. Fleet (University of Stellenbosch, South Africa), "RAFT Mediated Polysaccharide Copolymers"

Highlights of the conference included the following presentations:

- J. Feijen (Twente University, The Netherlands), "Novel Polymer Systems for Drug and Gene Delivery"
- H. Maeda (Sojo University, Japan), "Tumor Targeting Mechanism EPR-Effect and Advantage of Polymeric Drugs"
- F. Caruso (The University of Melbourne, Australia), "Bioinspired Nanoengineered Polymer Colloids"

- S. Brocchini (University of London, United Kingdom), “Bridging Disulphides: Site-Specific PEGylation of Proteins”
- H. Maynard (University of California, USA), “Synthetic/Biopolymer Hybrids”
- D. Bezuidenhout (UCT Medical School, South Africa), “Biomimetic Hydrogels in Tissue Engineering”

Plenary and invited speakers from overseas stressed how important it is for the African economy for scientists to receive training in macromolecules and chemistry at a postgraduate level. The South African Department of Science and Technology generously sponsored the attendance of delegates and students from Africa. Abstracts and papers are being collected for peer review for inclusion in *Macromolecular Symposia*.

The 10th event in this series will take place in September 2007 in Chobe, Botswana.

R.D. Sanderson <rds@sun.ac.za> served as conference co-chairman and IUPAC Representative. He works with the UNESCO Associated Centre for Macromolecules & Materials at the University of Stellenbosch. A. Fourie <aef2@sun.ac.za> served as the conference secretary and also is with the UNESCO Associated Centre for Macromolecules & Materials.

www.sun.ac.za/unesco

Advanced Materials and Polymer Characterization

by Michael Hess

The annual **World Forum on Advanced Materials (POLYCHAR 15)** was held in Búzios, Brazil, 16–20 April 2007. The popular Short Course on Polymer Characterization, an education project of the IUPAC Polymer Division, was held the day before.

After being held annually at the University of North Texas, Denton, Texas, USA, the conference—the scope of which has broadened since its original focus on polymer characterization—has been held in a different location each year since 2004. Guimarães, Portugal (2004), Singapore (2005), and Nara, Japan (2006). In 2007 it was held for the first time in South America, about 150 km north of Rio de Janeiro. This was the second conference on advanced materials in South America within one year. Macro 2006 was held in Rio in July 2006 (See Jan-Feb 2007 *CI*, p. 29).

The conference was organized by Eloísa Mano, professor at the Instituto de Macromoléculas, Universidade Federal do Rio de Janeiro (IMA/UFRJ). The organizing committee was led by Elizabete Fernandes Lucas, IMA/UFRJ chairperson, and Witold Brostow, honorary president, University of North Texas.

IUPAC has sponsored this conference for many years and it is well-known among scientists interested in synthesis, characterization, and properties, as well as processing and theoretical treatment of advanced materials such as novel polymers, blends, composites, and conjugates. Although the meeting was not divided into individual sections and did not have parallel sessions, it covered areas such as nano- and smart materials, surfaces, interfaces and tribology, mechanical properties and performance, synthesis, predictive methods, natural and biodegradable materials and recycling, biomaterials, characterization, and structure-properties relations. This year’s program had a strong focus on nanoscopic system/effects.

Michael Hess (left), Eloísa Mano, and Moshe Narkis.

There were a total of 181 registered participants from 21 countries: Argentina, Belgium, Brazil, Colombia, Croatia, France, Germany, India, Israel, Japan, Lithuania, Mexico, Portugal, Slovakia, South Africa, Thailand, Ukraine, UK, USA, Uzbekistan, and Venezuela. The conference featured 57 oral contributions and 160 posters. Many contributions were presented by students (12 oral presentations and the majority of the posters), which is reflective of the POLYCHAR philosophy of providing an international forum for young scientists and advanced students to present their scientific work, meet with colleagues and well-known scientists, exchange experiences, and make new international contacts. Previous meetings have resulted in many industrial contacts and international cooperation.

A number of awards are offered at POLYCHAR, particularly awards for young scientists (younger than 32) and students. The conference is the platform for the prestigious Paul J. Flory Research Award, and, this year for the first time, the International Materials Science Prize. The Flory Award was jointly awarded to Eloísa Mano, Universidade Federal do Rio de Janeiro, Brazil, for development of polymer science and education in Brazil, and Jean-Marc Saiter, University of Rouen, France, for his contributions to understanding the physics of the glassy state. Dusan Berek, Polymer Institute of the Slovak Academy of Sciences, Bratislava, Slovakia, was honored with the International Materials Science Prize for his imperturbably critical view on the limits of size exclusion chromatography, which has revealed many of the pitfalls of this popular characterization method and also for developing new methods of liquid chromatographic characterization of polymers.

In addition, IUPAC granted three Student Poster Awards:

- Gareth M. Bailey, University of Stellenbosch, South Africa, "Investigation of Hybrid Block Copolymers by the Offline Coupling of Chromatographic Fractionation to Various Instruments used in Morphological Characterization"
- Camila C. Dornelas, Instituto de Macromoléculas Professora Eloísa Mano, Universidade Federal do Rio de Janeiro, "Reactional Evaluation of Formation of PVP-Organophilic Montmorillonite Nanocomposites"
- Haley E. Hagg Lobland, University of North Texas, Denton, Texas, USA

Given the multitude of excellent oral and poster presentations, it is difficult to mention particular ones without overlooking important contributions. The conference program and the list of invited speakers is available at <www.ima.ufrj.br/polychar15>.

The Short Course on Polymer Characterization has been an integral part of the conference from the very beginning. It is held on the day before the conference to give attendees—students in particular—a tutorial on important characterization techniques presented by distinguished scientists. The short course provides basic information and recent developments in a condensed form for students, newcomers, and those who want to update their knowledge. The course attracted 119 enrolled participants, 78 of them students. The areas covered included "Liquid Chromatography" (Dusan Berek, Slovakia); "Tribology" (Witold Brostow, USA); "Integrated Rheology and Thermal Analysis" (Abel Gaspar-Rosas, Brazil); "Determination of Polymer Structures by Light-, Neutron-, and X-Ray Scattering" (Jean-Michel Guenet, France); "Viscoelastic and Dynamic-Mechanical Testing" (Michael Hess, Germany); "Electron Microscopy of Polymers" (Goerg Michler, Germany); and "Inorganic Polymers" (Jean-Marc Saiter, France).

Participants at POLYCHAR 15.

A nice feature of the short course is the fact that the lecturers are available for questions and discussions during the whole conference. Due to support from the IUPAC Polymer Division, it was possible to cover the expenses for the hand-outs and to waive the fee for a reasonable number of students.

POLYCHAR 16 will be held at the University of Lucknow, India, 17–21 February 2008. It is being organized by Ram Prakash Singh, vice chancellor of the University of Lucknow <www.polychar16.com>. The short course, which is being organized by Veena Choudhary and Michael Hess, will be held 14 February at the Indian Institute of Technology in New Delhi.

POLYCHAR 17 will be held in 2009 in Rouen, France (Jean-Marc Saiter is organizing), and POLYCHAR 18 will be held in 2010 in Bratislava, Slovak Republic (Dusan Berek is organizing).

Michael Hess <michael.hess@uni-duisburg-essen.de> is a professor at the Universität Duisburg-Essen, in Duisburg, Germany. He is a member of the IUPAC Polymer Division and its subcommittee on polymer terminology and subcommittee on polymer education.

Where 2B & Y

Announcements of conferences, symposia, workshops, meetings, and other upcoming activities

OPCW Academic Forum

18–19 September 2007, The Hague, Netherlands

The tenth anniversary of the entry into force of the Chemical Weapons Convention was 29 April 2007, a date on which many nations publicly renewed commitment to the multilateral treaty system and to the objects of the convention. The CWC is the first disarmament treaty that verifies the total and permanent abolition and eradication of a particular kind of weapon of mass destruction: chemical weapons.

The Organization for the Prohibition of Chemical Weapons (OPCW), created by the CWC as the world's chemical weapons watchdog agency, has initiated a series of events to educate the public about the progress of the CWC. The **Academic Forum** is an integral part of the OPCW's commemoration of the its tenth anniversary.

The Academic Forum aims to bring together leading academic experts, practitioners, diplomats, members of the media, and policy makers. The forum will examine the OPCW/CWC's history, the political and technical challenges it is confronted with today, as well as its place and role in the global nonproliferation network. As such, the forum will contribute to the discussion of issues concerning (chemical) disarmaments and the role of the OPCW/CWC for the next decade. The forum will also discuss how the OPCW may adapt to the new security environment and changes occurring in the chemical industry, including new chemicals and processes.

The first day comprises a plenary keynote address by Jayantha Dhanapala, former UN under secretary general of disarmament, and Rolf Ekéus, high commissioner on national minorities at the Organization for Security and Co-operation in Europe and board member of the Nuclear Threat Initiative. Concurrent sessions will be conducted, including panel discussions and workshops, on topics such as progress and challenges of eliminating CW stockpiles (as well as non-stockpile CW; the future of chemical weapons nonproliferation; the CWC and advances in science and technology; and the OPCW in a post-CW (almost) chemical-weapons-free world.

If you are interested in attending this event, please register by e-mail at <registration@opcwacademicforum.org>. For updates, information on speakers, relevant documents, and other information, please check the conference website.

www.opcwacademicforum.org

Pharmaceutical Chemistry

5–7 September 2007, Istanbul, Turkey

The **5th International Symposium on Pharmaceutical Chemistry (ISPC-5),** to be held 5-7 September 2007 in Istanbul, has multidisciplinary scope and will attract worldwide attendance from both academia and industry. Young scientists—graduate students and postdoctoral fellows—are encouraged to attend and to take advantage of reduced participation fees.

The program will include plenary and invited lectures, contributed oral presentations, and poster sessions in the following fields:

- Drug Design
- Synthesis of New Bioactive Molecules
- New Approaches in Medicinal Chemistry
- Pharmacology of Molecular Drug Targets
- Biotransformation of Drug Molecules
- Combinatorial Chemistry and High Throughput Screening
- Biotechnology in Drug Research
- Natural Products and Drug Discovery
- Chemogenomics in Drug Development
- Stereochemistry in Drugs
- Pharmaceutical Analysis and Validation

Aside from the scientific aspects of the program, attendees can explore Istanbul, one of the most interesting cities in the world. It embraces two continents, with one arm reaching out to Asia and the other to Europe. The former capital of three successive empires, Roman, Byzantine and Ottoman, offers innumerable museums, churches, palaces, grand mosques, bazaars, and sights of natural beauty.

Above all, ISPC will provide an opportunity for attendees to meet each other, build friendships, and contribute to lively discussions in the field of medicinal chemistry.

www.ispc5.hacettepe.edu.tr

FTIR Applied to Biological Systems

5–7 November 2007, Buenos Aires, Argentina

The **International Workshop on Infrared Spectroscopy Applied to Biological and Biomimetic Systems: From the Isolated Molecule to the Cell (FTIR 2007)** will be held 5–7 November 2007 in Buenos Aires, Argentina.

FTIR 2007 is being organized by the Laboratorio de Fisicoquímica de Membranas Lipídicas y Liposomas, Facultad de Farmacia y Bioquímica, of the University of Buenos Aires, Argentina.

The main purpose of FTIR 2007 is to facilitate discussions about all aspects of FTIR-based methodologies and their applications in physics, chemistry, biology, biochemistry, biophysics, and medicine. To fulfill this aim, topics such as Infrared Spectroscopy of Cells and Tissues, Low Temperature Infrared Spectroscopy, Infrared Spectroscopy of Lipids, Infrared Spectroscopy of Proteins, Infrared Spectroscopy in Molecular Diagnostics, and Infrared Spectroscopy in Biomimetic Systems will be discussed.

FTIR 2007 will be organized around plenary lectures, invited, contributed oral presentations, poster sessions, and special panel discussions. The conference provides an excellent opportunity to promote discussion about FTIR methodologies and their applications. For this reason, the participation of young scientists working in the above fields is strongly encouraged.

www.qui.uc.pt/~angoza/FTIR2007

ISRANALYTICA 2008

22–23 January 2008, Tel Aviv, Israel

ISRANALYTICA 2008, the 11th Annual Meeting of the Israel Analytical Chemistry Society will take place 22–23 January 2008 in Tel-Aviv. In recent years, ISRANALYTICA events have became the most important analytical chemistry event in Israel.

In 2007, ISRANALYTICA attracted over 2000 participants from the academy, chemical industry, major laboratories, and companies from Israel and 40 other countries. In fact, ISRANALYTICA combines the largest chemistry convention in Israel with the largest analytical chemistry exhibition in one location.

The scientific program will cover a large variety of modern topics in analytical chemistry. Leading academic researchers and industrial practitioners will present their recent achievements. The event will provide a forum for the exchange of exciting developments as well as problem sharing among leading scientists and expert representatives of major instrumentation companies. The program will consist of four plenary lectures by top international scientists, oral presentations (in parallel sessions) featuring speakers from Israel and abroad, and a large poster session.

The program will cover an assortment of topics in Analytical Chemistry:

- Separation Methods (CE, LC, GC and others)
- Mass Spectrometry
- Nano Analytical Chemistry
- Analytical Methods
- Bio-Analytical Methods
- Analytical Spectroscopy
- Proteomics, Genomics and Metabolomics
- Water Analytical Chemistry
- Analytical Chemistry in Homeland Security
- Forensic Analytical Chemistry
- Analytical Electrochemistry
- Analytical Sensors
- Chemometry
- Computerized Analytical Chemistry
- Legal aspects of Analytical Chemistry
- Regulations and Metrology
- The Teaching of Analytical Chemistry

The deadline for abstract submission is **1 October 2007**.

www.isranalytica.org.il

Mark Your Calendar

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

2007 (later than 15 July)

IUPAC poster prizes to be awarded

15–20 July 2007 • Heterocyclic Chemistry • Sydney, Australia
21st International Congress of Heterocyclic Chemistry
Dr. Kate Jolliffe, School of Chemistry, The University of Sydney, Sydney NSW 2006, Australia, Tel.: +61 2 9351 2297, Fax: +61 2 9351 3329, E-mail: jolliffe@chem.usyd.edu.au

16–20 July 2007 • Solution Chemistry • Perth, Australia
30th International Conference on Solution Chemistry
Prof. Glenn Hefter, School of Mathematical and Physical Sciences, Murdoch University, Murdoch, WA 6150 Australia, Tel.: +61 8 9360 2226, Fax: +61 8 9360 1711, E-mail: g.hefter@murdoch.edu.au

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

2–6 August 2007 • Organometallic Chemistry • Nara, Japan
14th International Symposium on Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS-14)
Prof. Koichiro Oshima, Department of Material Chemistry, Graduate School of Engineering, Kyoto University, Kyoto-daigaku katsura, Nishikyo-ku, Kyoto 615-8510, Japan, Tel.: +81-75-383-2437, Fax: +81-75-383-2438, E-mail: oshima@orgrxn.mbox.media.kyoto-u.ac.jp

4–12 August 2007 • IUPAC 44th General Assembly • Torino, Italy
IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org

5–11 August 2007 • IUPAC 41st Congress • Torino, Italy
Chemistry Protecting Health, Natural Environment, and Cultural Heritage
E-mail: IUPAC.2007@unito.it <www.iupac2007.org>

26–31 August 2007 • Plasma Chemistry • Kyoto, Japan
18th International Symposium on Plasma Chemistry
Mr. Tatsura Shirafuji, International Innovation Center, Kyoto University, Kyoto-Daigaku-Katsura, Nishikyo-Ku, Kyoto, 615-8520 Japan, Tel: +81 75 383 3052, Fax: +81 75 383 3031

27–31 August 2007 • Macromolecular Complexes • Fukuoka, Japan
12th IUPAC International Symposium on Macromolecular Complexes (MMC-12)
Dr. Naoki Toshima, Department of Materials Science & Environmental Engineering, Tokyo University of Science, Yamaguchi, SanyoOnoda-shi, Yamaguchi 756-0884, Japan, Tel.: +81 836-88-4561, Fax: +81 836-88-4567, E-mail: toshima@ed.yama.sut.ac.jp

2–7 September 2007 • Ionic Polymerization • Kloster Banz, Germany
International Symposium on Ionic Polymerization
Prof. Axel Müller, MC II/NW II, Universität Bayreuth, D-95440 Bayreuth, Germany, Tel.: +49 921 553399, Fax: +49 921 553393, E-mail: ip07@uni-bayreuth.de

23–28 September 2007 • Transactinide Elements • Davos, Switzerland
Third International Conference on the Chemistry and Physics of the Transactinide Elements (TAN'07)
Prof. H.W. Gäggeler, Paul Scherrer Institut, Radio- und Umweltchemie, CH-5232 Villigen, Switzerland, Tel.: +41 (0)56 310 24 01, Fax: +41 (0)56 310 44 35, E-mail: heinz.gaeggeler@psi.ch

23–28 September 2007 • Mendeleev Congress • Moscow, Russia
XVIII Mendeleev Congress on General and Applied Chemistry
Prof. Natalia P. Tarasova, D. Mendeleev University of Chemical Technology, Miusskaya Square, 9, RU-125047 Moscow, Russia, Tel.: +7 495 9732419, Fax: +7 495 2004204

30 September–5 October 2007 • Physical Organic Chemistry • Los Cocos, Cordoba, Argentina
9th Latin American Conference on Physical Organic Chemistry (CLAFQO 9)
Prof. Elba I. Bujan, Dpto. de QuÃmica Organica, Universidad Nacional de Cordoba—INFIQC, Fac. de Ciencias Quimicas, Medina Allende y Haya de la Torre, X5000HUA, Argentina, Tel.: +54 351-4334170, Fax: +54 351-4333030, E-mail: elba@fcq.unc.edu.ar

1–3 October 2007 • Systems for Energy Conversion • Moscow, Russia

International Conference and Exhibition "Molecular and Nanoscale Systems for Energy Conversion"
Prof. Sergey Varfolomeev, Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Kosygin St. 4, Moscow 119991, Russia, Tel.: +7 495-137-6420, Fax: +7 495-137-4101

17–21 October 2007 • Novel Materials • Shanghai, China

3rd International Symposium Novel Materials and their Synthesis (NMS-III)
Prof. Yuping Wu, Department of Chemistry, Fudan University, Shanghai, 200433 China, Tel.: +86 21 55664223

5–7 November 2007 • Infrared Spectroscopy • Buenos Aires, Argentina

International Workshop on Infrared Spectroscopy Applied to Biological and Biomimetic Systems: From the Isolated Molecule to the Cell
Prof. Andrea Gómez-Zavaglia, Universidad de Buenos Aires, Facultad de Farmacia y Bioquímica, Catedra de Quimica General e Inorganica, Junin 956. 2 P, C.P. 1113. Buenos Aires, Argentina, Tel.: +54 11 4964 8249, E-mail: angoza@interar.com.ar

28 November–1 December 2007 • Metallomics • Nagoya, Japan

International Symposium on Metallomics
Prof. Hiroki Haraguchi, Department of Applied Chemistry, Graduate School of Engineering, Nagoya-University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan, Tel.: +81-52-789-5288, Fax: +81-52-789-5290, E-mail: haraguch@apchem.nagoya-u.ac.jp

2–5 December 2007 • Food Security in Africa • Stellenbosch, South Africa

CHEMRAWN XII—The Role of Chemistry in Sustainable Agriculture and Human Well-being in Africa, Ms. Christelle Snyman, Tel.: +27 21 938 9245, Fax: +27 21 933 2649, E-mail: conference@chemrawn.co.za

2008

IUPAC poster prizes to be awarded

8–11 January 2008 • Agrochemicals • New Delhi, India

International Conference on Agrochemicals Protecting Crop, Health and Natural Environment,
Dr. N.A. Shakil, Division of Agricultural Chemicals, IARI, New Delhi 110 012, India, Tel.: +91 009818196164, Fax: +91 11-25843272

9–12 March 2008 • Heterocyclic Chemistry • Gainesville, Florida, USA

9th Florida Heterocyclic Conference
Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, Gainesville, FL 32611-7200, USA, Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

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

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

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

20th International Conference on Chemical Education: Chemistry in the Information & Communications Technologies Age, (20th ICCE)
Dr. Ponnadurai Ramasami, Department of Chemistry, University of Mauritius, Reduit, Mauritius, E-mail: p.ramasami@uom.ac.mu

12–17 October 2008 • Biotechnology • Dalian, China

13th International Biotechnology Symposium (ISB 2008): "Biotechnology for the Sustainability of Human Society"
Prof. Fengwu Bai, Dept. of Bioscience & Bioengineering, Dalian University of Technology, 2 Linggong road, Dalian 116023, China, Tel.:+86 411 84706329, Fax:+86 411 84708083, E-mail: fwbai@dlut.edu.cn

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

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

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- A 10% reduction in registration fees at IUPAC-sponsored conferences