



From the Editor

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In November 2003, I read in *Nature* an article by Steven Weinberg titled "Scientist: Four Golden Lessons." Soon afterward I made his first lesson my new-year's resolution. As I embark on 2005, I think that his second lesson might be a good resolution for this year.

Weinberg's first lesson was "**no ones knows everything, and you don't have to.**" He started by explaining that the ocean of bibliography associated with any scientific topic can be so overwhelming that it might discourage young graduate students from actually engaging in their own research. His advice is to just start the research, and pick up what is needed along the way. This might be true in graduate school, but it is also true in many other circumstances. In organizations such as IUPAC, new officers and new members have to gradually learn all of the rules and yet attend to their jobs to keep their momentum. Yet 2004 was a special year



for the officer who is the "rules keeper" or can I say the "handbook master" (i.e., the secretary general). In January 2004, David StC. Black replaced Edwin Becker, who had served IUPAC relentlessly for eight years. While his encyclopedic knowledge of IUPAC retired with him, Becker made sure to provide his successor with all the information he needed to continue the job. Thanks to that, David StC. Black has lost no time following in Becker's foot steps and taking the lead, even though he probably did not know everything before he started.

Weinberg's second lesson is "**go for the messes—that's where the action is.**" This advice is also pertinent to IUPAC; not that the Union itself is a mess, but that sorting out problems is what I think we are good at. Remember that one of IUPAC's objectives is "to study topics of international importance to chemistry that need standardization or codification." Everyone will agree that in any field it is the mess prior to standardization that justifies the need for standardization. So, if you like the messy topics and the challenge of resolving discrepancies, IUPAC is certainly a good playing field, and it is up to you to join the team.

For me, working with IUPACers—be it officers or members of any kind—is an endless game. I think of myself as an assistant referee, keeping score and helping new players to sort out the rules. (It might not sound like it, but seriously, it is a fun job!) To all of you on the field, may I say thanks for playing and best wishes for the new year.

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Cover: The name roentgenium, with symbol Rg, was officially approved by IUPAC for the element of atomic number 111. The element was named after Wilhelm Conrad Roentgen, who revolutionized medicine with his discovery of X-rays in 1895. Photos credit: AIP Emilio Segre Visual Archives, Lande Collection. Cover design: Purple Zante, Inc.

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Rg
roentgenium



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enclosed with this issue.*

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Did You Say *the* IUPAC Conference?



by David StC. Black

One of the most-effective ways in which IUPAC promotes chemistry is through an array of international conferences that it sponsors. These events—which bring together a diverse group of researchers from all fields of chemistry to discuss the latest developments in research—provide tremendous stimulus for all chemists in the field, especially younger ones. Over

the years, IUPAC conferences have maintained a high level of quality. In fact, one frequently hears comments to the effect that something needs to be achieved in time for “the IUPAC conference.” While many researchers have one particular IUPAC conference or conference series in mind, because of the particular relevance to their field, it is important to remember that there are many “IUPAC conferences.” However, these many conferences come in essentially four different categories.

1. A conference that is part of an established series coordinated by a division or standing committee.

These conferences are specifically driven by IUPAC divisions and standing committees, to the extent that they take responsibility for ensuring the continuity of a series. Consideration is given to location so that there is wide geographical diversity. Although the particular conference organizers actually arrange and manage the details, the relevant IUPAC committee or subcommittee assists in terms of promotion and providing benign oversight of the scientific quality. These conferences are called **division-sponsored** and might also be referred to as “core” conferences.

2. A conference that is proposed by an IUPAC body as a one-time conference, but sometimes becomes the initial conference in a new series.

3. A conference organized with no IUPAC impetus, but for which IUPAC sponsorship is sought. These conferences are organized as one-time events or as

part of a non-IUPAC series of conferences, and have no affiliation to IUPAC other than that the application for IUPAC sponsorship. When such an application is submitted, it is referred to any relevant division or standing committee for assessment or comment, and a decision is made—on the basis of quality and sound organization—whether or not to grant IUPAC sponsorship. It is perhaps worth noting here that such sponsorship is in no way financial, but is simply an endorsement of quality.

4. A conference or workshop that is part of an IUPAC project.

IUPAC, through the Executive Committee and the Bureau, is keen to enhance and publicize the role it plays in stimulating and promoting chemistry and chemical research, and in raising its profile among younger chemists, some of whom might subsequently be attracted to work in task groups on IUPAC projects. There is a need to improve the flow of information about IUPAC activity to the chemical community. One plan is to try to provide a little more information through the IUPAC conference representative, who is usually given a small role in the ceremonial part of a conference. Conference organizers are also frequently encouraged to set aside a little time during the conference for a general discussion of current, relevant IUPAC projects, and for identifying potential future projects. Clearly, it is easier to do this at division-sponsored conferences than at conferences over which IUPAC has less control. Consequently, IUPAC is deliberately targeting these “core” or division-sponsored conferences to develop some new programs.

One of these new programs is the IUPAC Poster Prizes, which recognize outstanding poster presentations at IUPAC Congresses and IUPAC division-sponsored conferences at which poster sessions are held. Also, at the request of a National Adhering Organization (NAO) poster prizes may also be awarded at a single chosen national conference each year. Typically two, or a maximum of three, prizes will be awarded, with the number deliberately kept low to add to the prestige of the prize. Prize winners receive a certificate signed by the IUPAC president, a copy of the *Compendium of Chemical Terminology*, and a two-year subscription to *Chemistry International*. It is hoped that what these prizes lack materially is more than compensated for by a prestigious addition to the winners' curriculum vitae. These prizes can therefore

be awarded at conferences listed under categories 1 and 2 above, but are not available to those in categories 3 and 4.

At the latest Bureau meeting, held in October 2004, it was noted that the hosting of an IUPAC-sponsored conference was a significant benefit to the host country, not only in terms of chemical stimulus, but economic stimulus as well. Previously, the benefits of IUPAC sponsorship applied equally to NAO and Associate NAO countries. After a thorough discussion of the situation, the Bureau resolved that IUPAC sponsorship should be restricted to conferences held in NAO countries and not those of Associate NAOs. Under the previous rules, there was little incentive for a country to move from Associate (ANAO) to full status (NAO). The new ruling should not be seen as a penalty against ANAOs, but rather a contribution of real value to countries with NAOs, and a strong incentive for countries to participate in IUPAC as full status members.

There have also been some modifications made to the guidelines for the IUPAC program of Financial Support for Conferences. This rather modest support can apply either to conferences dealing with "New Directions in Chemistry" or to conferences in "Scientifically Emerging Regions." There are newly revised, separate application forms for these two categories. The current biennial budget for this program is USD 65 000. In the past two years, approximately 10

conferences have received support from this program. Applications must be made through a division or standing committee, and the funding decisions are made by the Project Committee. In order not to prejudice any support for "developing countries," which often are ANAOs, the restriction referred to above does not apply to the Financial Support for Conferences program. Here, the only restriction placed upon the geographic location of a conference is that it should not be held in a developed country that is not represented in IUPAC by an NAO.

I should like to return briefly to the issue of whether or not a country represented by an ANAO should change to NAO status, and the financial implications of the increase in subscription costs. Some countries make use of the Company Associates program to collect funds that cover the national subscription. The Committee on Chemistry and Industry is offering to assist adhering organizations with the recruitment of such company associates, as part of a seriously enhanced program to increase their number and influence in IUPAC.

Finally, I hope that the New Year of 2005 will be chemically successful and personally satisfying for all readers. ☺

IUPAC Secretary General David StC. Black <d.black@unsw.edu.au> has been involved in IUPAC since 1994 as a committee member of the Division of Organic and Biomolecular Chemistry, and served as Division vice president during 2002–2003.



IUPAC Prize for Young Chemists

Supporting the future of chemistry

The encouragement of young research scientists is critical to the future of chemistry. With a prize of USD 1000 and paid travel to the next IUPAC Congress, the **IUPAC Prize for Young Chemists** encourages young chemical scientists at the beginning of their careers. The prize is based on graduate work and is given for the most outstanding Ph.D. thesis in the general area of the chemical sciences, as described in a 1000-word essay.

Call for Nominations: Deadline is **1 February 2005**.

For more information, visit www.IUPAC.org/news/prize.html or contact the Secretariat by e-mail at secretariat@iupac.org or by fax at +1 919 485 8706.

Old Warriors Get New Armor

Scientists and Archeologists are Working to Preserve the Coatings on China's 2 200-Year-Old Terracotta Army*

by Matthew V. Veazey

Hidden underground for more than 2 millennia, the coatings on a famous collection of ancient Chinese artifacts unearthed just 30 years ago are being preserved in a decidedly modern fashion.

A popular attraction for tourists and archeologists alike, the burial complex of Emperor Qin Shihuang near Xi'an, China, features thousands of terracotta statues formed in the likeness of warriors. China's first emperor, Qin Shihuang, ruled from 221 to 210 B.C. According to Catharina Blänsdorf, a conservator with the Bavarian Cultural Relics Office (Munich, Germany), "Qin Shihuangdi" means "First Heavenly Emperor of Qin." The name was adopted by Ying Zheng, who became king of the state of Qin in 246 B.C. at age 13. From 238 to 221 B.C., he conquered the other kingdoms that eventually would be part of his empire.

Now that approximately one-third of Qin Shihuang's "Terracotta Army" is no longer buried, and despite the fact that unearthed statues are now protected inside a large hall, the original lacquer and min-

eral-based paint on the statues are susceptible to flaking. Since 1988, a team of Chinese and German conservators and scientists have been trying to stabilize this "polychromy" or "paint layer." Having successfully used a new treatment on some of the statues, the investigators are confident that the paint and lacquer will continue to stand the test of time.

An Archeological Treasure

Blänsdorf says that the Terracotta Army and the surrounding burial complex honor the accomplishments of one of China's most famous emperors. "It is one of the largest burial complexes of Chinese emperors," says Blänsdorf, adding that most of the burial complexes of other emperors remain unexcavated. "The Terracotta Army belongs to the burial complex of the first Chinese emperor, who is very important for Chinese History because he united the China empire and laid the foundation of the state existing until today." Work on another important Chinese landmark—the Great Wall—began during the Qin Dynasty, which ended four years after the first emperor's death in 210 B.C.

The Terracotta Army was discovered in 1974 by farmers digging for water near the town of Lintong, which is approximately 45 km east of Xi'an. The entire burial complex was adorned with valuables by Qin Shihuang's subjects to assist him in the afterlife. Blänsdorf says that the elaborate system of pits containing "precious burial objects" set the standard for how successive emperors would be interred. "Later on, the 'normal furnishing' of an emperor's tomb included a terracotta army and everything that belonged to the emperor's court," she says, noting that the Terracotta Army at Lintong is the earliest one of its kind with so many figures.

Blänsdorf notes that each of the more than 100 pits depicts a specific part of the emperor's court. The terracotta soldiers are in one pit. Other pits include depictions such as horses, bronze birds, chariots, weapons, judges, and civil servants. The only known human remains are those of the emperor's children and the conscripts who worked on the burial complex. The emperor's actual tomb, surrounded by the network of pits, rests inside a 70-meter-high mound that has not yet been excavated. "In the future, with more and more



This photo shows a group of warriors in the Terracotta Army at the burial complex of China's first emperor. Photo ©copy-right Professor A.C. Scott, Geology Department, Royal Holloway University of London. Used with permission.

*This article first appeared in *Materials Performance*, April 2004. Reproduced with permission.



A terracotta fragment treated with HEMA. Photo courtesy of Heinz Langhals, Department of Organic and Macromolecular Chemistry, Ludwig-Maximilians University of Munich.

pits unearthed, the focus probably will shift from the terracotta to the mausoleum itself,” Blänsdorf predicts. “Slowly we see the army as only a small part of the whole complex that contained everything the emperor had in his life or could need in a life after death.”

Premium Polychromy

Not only were the items in the pits considered status symbols, but the manner in which they were painted was considered high art. “The statues have been painted after firing,” says Blänsdorf, explaining that this “cold painting” method did not use glaze. “The priming layer consists of East Asian lacquer [called “qi” in Chinese], a natural product that is obtained by injuring the bark of the Lacquer tree [*Toxicodendron verniciflua*] and collecting the sap. It turns black during the hardening process. It is—and always has been—very precious, so priming the terracotta statues with qi lacquer is a luxury.”

Noting that the priming is applied in two thin lacquer layers, Blänsdorf says that thick layers of natural and artificial mineral pigments are applied on top of the lacquer. “The aqueous binding media could not be determined but could have been something like gum or animal glue,” she says. The various pigments present in the top layers include bone white, lead white, hematite, cinnabar, malachite, azurite, black ink, kaolin, red and yellow ochre, minium, and yellow lead.

A New Combination

“HEMA [HydroxyEthylMethAcrylate]/electron beam solidifying has been specifically adapted for the Terracotta Army,” says Heinz Langhals, Professor of Organic and Macromolecular Chemistry at Ludwig-Maximilians University of Munich (Munich, Germany). Langhals’ technique involves treating the lacquer layer with HEMA, which is a water-soluble monomer that is said to penetrate the lacquer, paint, and terracotta. “It penetrates objects like water does, but it evaporates as long as it is not polymerized—and therefore it is

only polymerized in the lacquer layer and the interface toward the terracotta,” explains Blänsdorf. The polychromy being treated subsequently is barraged by electron beams emanating from a particle accelerator, which dramatically increases the speed—and hence the energy—of electrons. The electron beams reportedly cause the HEMA to cure, establishing a bond between the terracotta and the polychromy. Langhals emphasizes that a distinct protective layer does not form in this case. “Such a layer would loosen from the terracotta,” he explains.

Langhals points out that his preservation method is unprecedented because it links two previously unrelated technologies: polymeric HEMA and electron beam-induced polymerization. “The combination is new,” he says. Polymeric HEMA, which Langhals describes as a “very stable substance,” has been used to isolate ceramic water pipes and other building applications requiring isolation—particularly in cases involving contact with soil and water. “The long-term stability, even under severe microbial attack, is of special importance for such applications,” he explains. The electrical and electronics industry has used electron beam-induced polymerization to prepare insulating materials such as heat-shrinkable tubes and foils.

Out in the Open

Blänsdorf admits that the Terracotta Army’s exposure to climatic conditions, thousands of visitors each year, dust, and other factors can make preservation of the statues particularly cumbersome. “It is a big challenge to preserve and exhibit such a huge excavation in situ,” she says, adding that such a situation is rare in the conservation of ancient artifacts. “Normally, the objects are taken out and are presented in a museum and the site is covered again or destroyed.”



The shiny areas in this close-up of a terracotta fragment may appear wet, but they are actually solid HEMA that has polymerized at the surface. Photo courtesy of Heinz Langhals, Department of Organic and Macromolecular Chemistry, Ludwig-Maximilians University of Munich.

Old Warriors Get New Armor

According to Blänsdorf, it is generally true that ancient objects are better preserved in dry, sandy environments rather than moist, muddy ones. “But objects can also be very well preserved in humid or wet environments—for example, on the bottom of the ocean,” she adds. “The material of the object is important. In the given environment in Lintong, inorganic materials such as stone, metal, and pigments are more stable than the organic materials such as wood, fabric, leather, and binding media. This lacquer on the terracotta objects is an organic material.”

A problem at the Lintong site that Blänsdorf and other conservators are trying to manage is the dramatic change in humidity to which an artifact is exposed once it is unearthed. “What produces the damages are the changes of the environment,” she says. “If you put objects from dry to wet or wet to dry environment, they ‘suffer’ from physical and chemical changes taking place. In our case, we have an organic material—the lacquer—that has spent 2 200 years in a wet environment [loess soil that ‘stores’ a great deal of groundwater]. Water has penetrated into the material, water-soluble components have been ‘washed out,’ and the whole structure is swollen. After excavation, the water evaporates, the material loses volume, shrinks, and falls apart.”

Emphasizing that the terracotta itself is in very

good condition, Blänsdorf points out that the rapid escape of moisture from the soil threatens the lacquer layers as well as other materials in the pits. “Without

conservation, the paint is completely lost [approximately] one week after excavation,” she says, adding that the biggest problem for the preservation of sensitive materials is the rapid drying out of the soil. “The loess soil cracks and crumbles, and sensitive organic materials [such] as the polychromy and remnants of wood, leather, textiles, etc. suffer and decay,” says Blänsdorf. “With better and more careful methods and treatment of the objects dur-

ing excavation, much more can be preserved. This is developing in a promising way.”

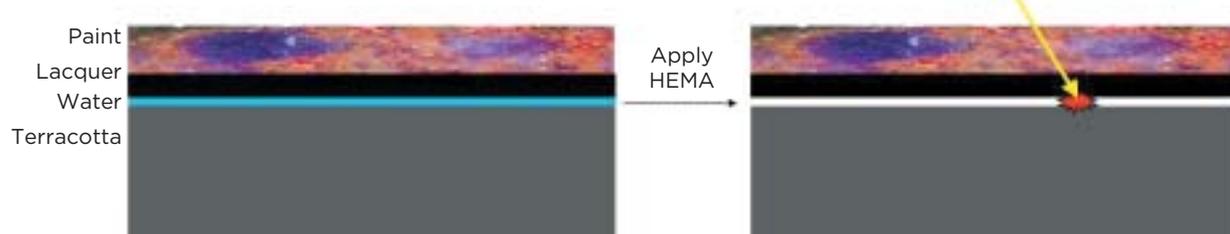
Blänsdorf notes that the HEMA/electron beam technique is being developed to integrate three design characteristics: large-scale usability, the capability to function properly despite the site conditions, and low-cost simplicity.

Not Just for Warriors

The researchers contend that video holography has shown that the HEMA/electron beam method can visualize changes of dimensions—such as deformations and the formation of cracks—on a microscopic scale and detect “movements” caused by changes in humidity. Langhals explains that holography, a nonde-

HEMA/Electron Beam Hardening

This diagram illustrates the HEMA/electron beam solidifying process. After HEMA is applied to terracotta coated with paint and lacquer, an electron beam is applied. The electron beam penetrates the paint and lacquer, causing the original water to evaporate and allowing the HEMA to cure and establish a bond between the polychromy and terracotta. Diagram courtesy of Heinz Langhals, Department of Organic and Macromolecular Chemistry, Ludwig-Maximilians University of Munich.



Old Warriors Get New Armor

structive testing method that uses laser light to examine the surface of a material, has measured the three-dimensional changes, or movements, of the lacquer layer-evidence that curing occurs.

Pointing out that he is optimizing his invention for use at the burial site (it is not up to full scale at this time), Langhals contends that the HEMA/electron beam technique could be useful in other archeological restoration projects. "I see a market for HEMA and electron beam polymerization in the consolidation of damaged surfaces of terracotta, ceramic materials, stone, wood, and so on because monomeric HEMA can penetrate the surface of such things and can be solidified by electron beam polymerization," he says. "The penetration of electrons is high enough that surfaces and lower layers [but not the substrate] can be

solidified. The polymeric HEMA allows water steam to penetrate. Thus, there are no problems with changes of humidity. Therefore, the method is especially suitable for the conservation of artwork." 

Matthew V. Veazey is a staff writer for *Materials Performance* magazine, published by NACE International in Houston, Texas, USA.

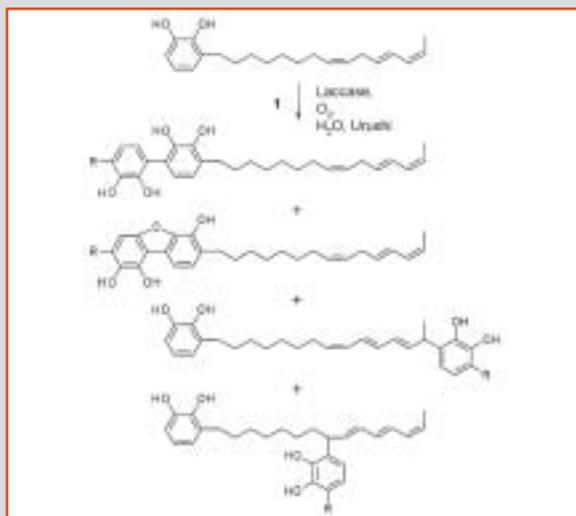


Conservators in Lintong examine a statue of a kneeling archer for cracks. Photo courtesy of Catharina Blänsdorf, Bavarian Cultural Relics Office, Munich, Germany.

For more details on the chemistry involved, see the "Minireview" on conservation techniques by Heinz Langhals and Daniela Bathelt in *Angew. Chem. Int. Ed.* 2003, 42, pp. 5676-5681, and references therein.

Properties and Processing of Qi-Lacquer

Qi-lacquer is formulated from the sap of the lacquer tree (*Rhus vernificera* Stokes, new nomenclature: *Toxicodendron vernicifluum* [Stokes] F.A. Barkley) and is still used today. The lacquer is first conditioned by stirring and warming. The crude lacquer sap contains urushiol (1 in scheme on the right) and analogous components with a smaller number of double-bonds in the side chain. (The name urushio usually refers to a mixture of pyrocatechols with a side chain of 15 or 17 carbon atoms which contains up to three double bonds. The configuration at the double bonds and the exact composition depends on the source of the natural product mixture.) The content of urushiol should be more than 45% (preferably 70%) to obtain a smooth layer of lacquer. Hardening in air is induced by the copper-containing enzyme laccase (content 1% in the crude sap). Polymerization of urushiol proceeds through electron-transfer reactions with participation of both the aromatic structure and the side chains.



The formation of a smooth layer of lacquer is influenced by carbohydrate components, which give structure to the polymer. No nitrogen is detected in the hardened lacquer (detection limit inferior to 0.01 % by elemental analysis) as residues from laccase. A constant high humidity of 75-85% and a temperature of 25-30 °C are important for the formation of a high-quality lacquer layer.

Fun and Games in Chemistry

On Sciencetons, and Other Light-Hearted Mind-Benders that Help Us Appreciate Chemistry

by D. Balasubramanian

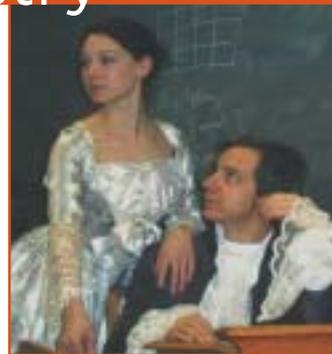
Teaching chemistry and encouraging people to appreciate chemistry are made easier and livelier by using “fun” and games, such as cartoons, poems, puzzles, plays, and skits. This article was triggered by a set of science cartoons created by a fellow chemist from India, which led me into looking at similar and related attempts by a few others, particularly in chemistry. Even a cursory search of the Internet has led to a wealth of interesting examples. What follows is, as they say, the tip of the iceberg. Which, incidentally, led me to the site that asked the intriguing question: Will ice float in boiling water? The answer, I found to my surprise and enlightenment, is that it does indeed float on boiling water. One Mr. John Link actually tried this and found it to do so. The reason is that the density of water at 100 °C is 0.958 g cm⁻³ while that of ice is 0.917 <www.madsci.org>.

The sections that follow describe plays, poems, anagrams, palindromes, cartoons, and crossword puzzles that involve chemistry.

Plays

As Carl Djerassi and Roald Hoffman have demonstrated, some plays can also be intellectually stimulating and challenging. Their notable play *Oxygen* asks the audience to make up its own mind about who should be given credit for the discovery of oxygen: Joseph Priestly, Antoine Lavoisier, or Wilhelm Scheele. The play also highlights the unappreciated contributions of women in science, such as Lavoisier’s wife who played a key role in his work. Following up on this idea, the play includes a “Retro-Nobel Prize,” where a woman heads the award committee to decide who is the true discoverer of oxygen.

Then there is the three-act play *The van Deemter Equation* by Christa Colyer of Wake Forest University on high-performance liquid chromatography (HPLC). The performance involves scores of participants, with act one on Eddy Diffusion, act two on Longitudinal Dif-



A scene from the play Oxygen, Antoine Lavoisier and his wife Marie Anne <www.djerassi.com>.

fusion, and act three called Rate of Mass Transfer. This play also becomes a teaching tool, since it asks questions regarding the mobile and stationary phase, the role of solute molecules and so forth.

[Incidentally, the van Deemter equation itself is written as:

$$H = A + B/u + C u$$

with A, the eddy diffusion (or multipath term); B, the longitudinal diffusion; C, the resistance to mass transfer; and u the velocity of mobile phase.]

Poems

On a lighter note, chemistry has found its way into poems. Professor Steven Hardinger of UCLA challenged his students to write about chemical concepts in the Japanese Haiku verse style (three lines of five, seven, and five syllables, respectively), which resulted in some gems. Here are three of them:

Brönsted says “Give H.” Lewis says “Take electrons.” Acids will do both!

Base asks the acid, “Aren’t you related to me? I’m your conjugate.”

Molecular angst, is caused by torsional strain, Rotate sigma bond.

Here are some chemistry poems by Dr. Brenna E. Lorenz, Division of Natural Sciences, University of Guam. They are not done in Haiku, but in the more traditional English rhyme and meter.

Old Man Stokes

*Old man Stokes was a gentleman fine
Who lived beside the Raleigh line;
Old anti-Stokes, his existence denied,
Lived never-the-less on the other side.*

Bonding

Carbon

*With orbitals of sp³
I want to make a bond with thee,
Together we, covalently,
Will translate through eternity!*

Hydrogens

*Oh, carbon atom, we respond
With our s orbitals, to bond!*

Ode to Pyridine

*Ah, sweet pyridine, thy vagrant scent
Doth waft up from my test tube, redolent,
And venture forth, in tendrils of perfume
To every distant corner of the room.*

*No hood on earth is there that can suppress
The wand'rings of thy cyclic happiness;
No hood is there that can contain or hide
Thy aromatic eagerness inside.*

*No prof or student, passing through the room,
Can quite evade the tendrils of thy fume,
Nor can they, drawing breath, stay unaware,
That thy six-membered rings pervade the air.*

*Come, my sweet amine, no more conspire
To fill this humble lab of mine entire,
Instead, let love thy pungency efface
In some fair Lewis acid's fond embrace.*

*Yes, lend her thy electrons, sweet amine,
That lie outside thy circle, lone and lean,
And stretch thy bonds in themomotive glee
In some wild acid's hungry company!*

Anagrams

These are favorites of crossword buffs, but they also have been used in science, and in particular chemistry. Look at some ingenious molecular anagrams.

Rick Rothstein rearranged the letters of

"Acetylsalicylic acid/Acetaminophen" to yield "Typically, a 'cool act' in ache medicines," and "Economically cheap, it isn't a delicacy."

"Deoxyribose Nucleic Acid" becomes: "Encode idea by coil" is crux" in this anagram by Mike Mesterton-Gibbons.

Larry Brash's anagram of "Tetrahydrocannabinol" becomes "Inhaled, contrary to ban."

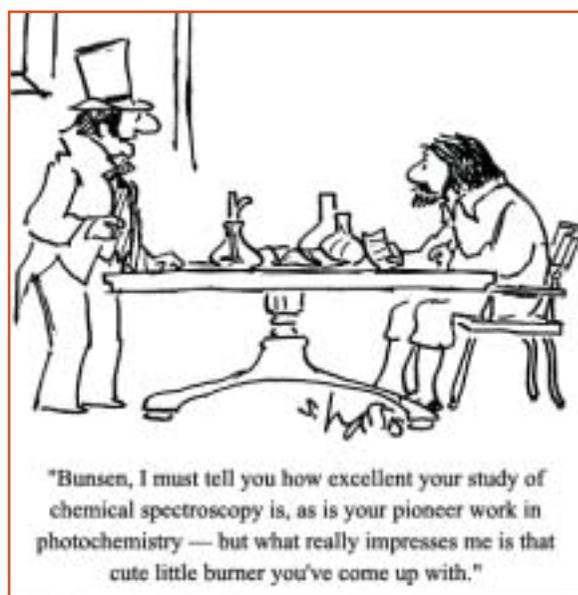
Rick Rothstein created a number of anagrams from "Lysergic acid diethylamide": "Idyllic images: the icy dread"; "Idyllic imagery; is detached"; "My hysterical glee? I did acid"; "This idyllic mirage decayed"; and "Dreamy stage, icy chill; I died."

Palindromes

According to Marilyn Dunker of the Special Libraries Association, University of Washington, there are hardly any palindromes in chemistry names. The best I could come up with was "No yarn in rayon." I am sure some readers will be able to better this poor one. However, when we write out the chemical structures, particularly of symmetric molecules (starting from ethane), we find palindromes. Of course, the double helical sequences of DNA abound in palindromic sequences that are hydrolyzed by specific enzymes.

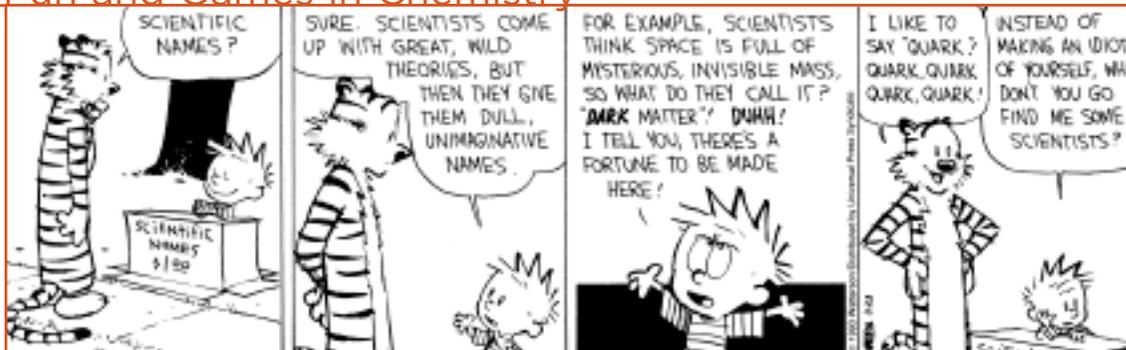
Cartoons

The well known master in the genre of science car-



Cartoon copyrighted by Sydney Harris, printed with permission.

Fun and Games in Chemistry

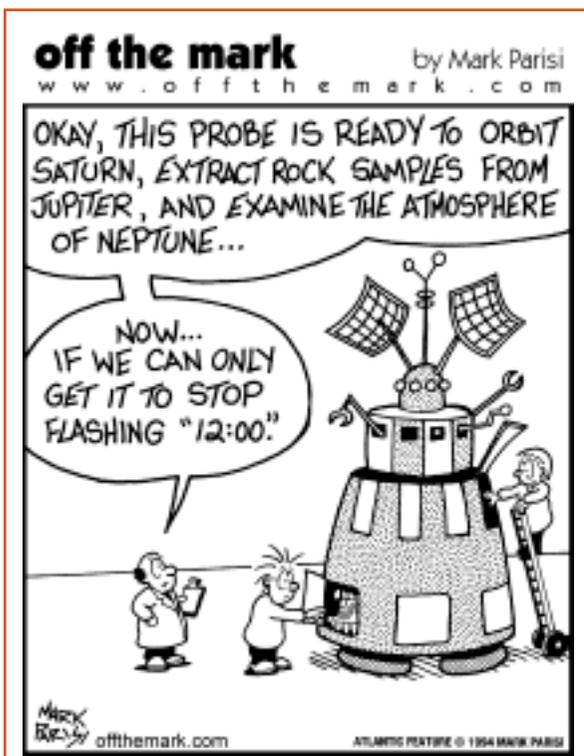


CALVIN AND HOBBS ©1993 Watterson. Reprinted with permission of UNIVERSAL PRESS SYNDICATE. All rights reserved.

toons is Sydney Harris. He has a whole Web site <sciencecartoonsplus.com> devoted to his art, which is thoroughly enjoyable. We reproduce just one of his here (page 9).

Even in the comic strips of daily newspapers, there are occasional gems. The one I like is from "Calvin and Hobbes," (see above) where the ever-creative boy Calvin decides to open a shop for devising better scientific names. He is disgusted with the fact that scientists think space is full of mysterious, invisible mass and end up calling it by the unromantic name of "dark matter." He opens a consulting firm to do better. Then there is the series by Mark Parisi called "Off the Mark" in which he spoofs science topics. A particularly topical one involves a super-hi-tech machine that keeps on flashing "12:00" (see below).

While these three examples are universal, cartoonists use their medium to highlight, or make light of, matters of the moment or matters relevant to their own immediate society or place. The famous political cartoonist of India, R.K. Laxman makes fun of Indian science in his cartoons (below). And in Pradeep K. Srivastava, of the Chemical Technology Division of the Central Drug Research Institute, Lucknow, India, we have a fellow chemist who has initiated what he calls "Scientoons." In one series, he takes a look at, and occasionally makes a different interpretation of, some scientific terms and concepts (bottom right). More of Scientoons can be viewed at <www.scientoon.com>.



Cartoon copyrighted by Mark Parisi, printed with permission.



Fun and Games in Chemistry

Puzzles

One of the more interesting sets of crossword puzzles in chemistry can be accessed at the Web site <creative-chemistry.org.uk/funstuff/xword/families.htm>, which has crossword puzzles in various topics such as metals extraction, metals and ores, chemistry apparatus, acids, alkalis and salts, organic chemistry, chemical families, rates of reactions, Haber process, hard rocks, and fossil fuels. Another interesting Web site, which has puzzles in many branches of science, is <sciencespot.net/Pages/classpuzzle.html>. A particularly interesting puzzle here is called the Periodic Table Challenge, which asks, "How many words can you make with chemical symbols?" Apparently someone made as many as 1458 words.

A chemist who can better this record, and also better Mr. Rick Rothstein above in his anagrams, will not only be a better chemist but also a man/woman of letters! 🧪

Periodic Table Challenge

How many words can you make using the chemical symbols in the Periodic Table?

You may use the symbols more than once in a word, but you cannot mix up the letters. The symbols must be used as they appear in the Periodic Table. You may also use words with only one or two letters as well as the names of people, places, and other elements. You must provide the symbols (in correct format) as well as the word.

Examples:

He + At = Heat

N + O + B + O + Dy = Nobody

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The DIDAC set of teaching aids is now available online at www.iupac.org/didac



IUPAC acknowledges the generous and continuous financial support of UNESCO towards the dissemination of DIDAC. Free CDs are available upon request to the IUPAC Secretariat <secretariat@iupac.org>.

IUPAC Division VI Takes Stock and Looks Ahead

by Patrick Holland and Kenneth Racke

The Division of Chemistry and the Environment (IUPAC Division VI or DCE), which has historically had one of the broadest mandates of active bodies within IUPAC, deals with many areas of applied chemistry (soil, water, air, food, environmental contaminants, and naturally occurring toxins). In fact, DCE was formerly known as the Division of Applied Chemistry until its reconstitution in 1996. In the preceding years there were a number of changes to the supporting commissions, with a number of splits and mergers occurring. Particular areas of intense project activity during the commission-era included the chemistry of fats and oils, pesticide environmental chemistry, soil-and water-pollution chemistry, and the chemistry of mycotoxins. Expertise in the area of fundamental biophysico-chemical processes was added during 1996, at which time the Commission on Fundamental Environmental Chemistry was transferred to DCE from the Physical Chemistry Division.

The current Division Committee, of which Kenneth Racke is president and Patrick Holland is secretary, last met in May 2004 in Bethesda, Maryland, USA. At that meeting, DCE affirmed the following slightly revised terms of reference:

Through its internationally recognized membership and project teams, the Division of Chemistry and the Environment (DCE) will provide unbiased and timely authoritative reviews on the behavior of chemical compounds in food and the environment. The DCE will undertake both fundamental and applied evaluations that contribute to solving environmental problems and enhancing the quality of food on a global scale.

Following the cessation of commission activities in 2001 and the IUPAC-wide move to a flexible, project team-based system, it was agreed that DCE required a strong sub-structure to fulfill its terms of reference.

Thus, several subcommittees assist DCE with identifying new project areas, stimulating proposals and recruitment of project teams and leaders, and communicating to an external audience on issues of environmental and food chemistry. Four subcommittees were formed to handle the following key project areas in the DCE:

- Food Chemistry (current subcommittee chairman: Patrick Dysseler)
- Biophysico-Chemical Processes in Environmental Systems (Nicola Senesi)
- Chemistry of Environmental Compartments (Yehuda Shevah)
- Crop Protection Chemistry (Ken Racke)

Project Activities

Projects sponsored by the DCE generally fall into three broad categories. These categories are described below along with some recent examples.

Authoritative Reviews. The expertise within the DCE subcommittees is used to coordinate reviews, which are generally published in book form. For example, the Wiley book series on "Analytical and Physical-Chemistry of Environmental Systems" was edited by DCE members. Top international experts were recruited to write the chapters of each volume in the series. Nine volumes have been published in the particular so far, and two more are currently in preparation as part of specific DCE projects. These include *Bio-Physical Chemistry of Fractal Structures and Processes in Environmental Systems* (project #2003-014-2-600), led by task group chairman/editor Nicola Senesi, and *Environmental Colloids: Behavior, Structure, and Characterization* (project #2004-015-1-600), led by task group chairman/editor Kenneth Wilkinson. One added benefit of this cooperative approach with Wiley is that book royalties are credited back to DCE so that it may sponsor additional projects in the series.

Technical Evaluations. These are traditional IUPAC projects that focus on developing a critical evaluation and arriving at a set of specific recommendations to assist and influence research and regulatory approaches. Primary areas of emphasis include definitions, methodologies, and regulations dealing with environmental or food chemistry. For example, two influential glossaries previously published in *Pure and Applied Chemistry* are currently under revision via

new project teams. These are *Glossary of Terms in Atmospheric Chemistry* (project #2003-030-1-600), led by task group chairman Tomislav Cvitas, and *Glossary of Terms Related to Pesticides* (project #2004-002-1-600), led by task group chairman Gerry Stephenson.

A good example of the potential impact of such projects in the regulatory arena is provided by the recently completed *Regulatory Limits for Pesticide Residues in Water* (project #1999-017-1-600), led by task group chairman Denis Hamilton. This critical evaluation of assessment methodologies for establishment of standards drew attention to the varied nature of current practices, which range from very scientifically based to politically based, and made practical recommendations targeted in particular at developing countries seeking to establish a way forward. It so happened that the final report was completed at just the moment this issue was reaching a critical point in India, and the recommendations were prominently featured at a conference of government and private-sector policymakers who sought to resolve their differences on the issue. This is an excellent example of the type of influence IUPAC can exert by highlighting the fundamentals of applied chemistry and chemical principles—areas that sometimes not given enough prominence.

Outreach. In addition to standard IUPAC sponsorship of important chemistry conferences, DCE has made strong efforts to actively plan and organize international congresses and workshops. The DCE has not been satisfied just to have some group adopt the IUPAC name and then run a conference under local leadership and with token or no IUPAC involvement. These conferences are designed not only to bring together leading scientists and regulators to exchange and debate their latest findings, but also to highlight key IUPAC projects and project outcomes. Multiple levels of IUPAC involvement are maintained, from the organizing and scientific committees to individual lectures highlighting IUPAC projects. These technology-transfer activities have involved three types of conferences.

First, for more than 20 years DCE has been involved with two long-standing international congresses. These events have consistently attracted 500-1000 or more of the top international experts, and are generally organized in cooperation with a major national/regional chemistry society and held in a world-class city.

- **IUPAC International Symposium on Mycotoxins and Phycotoxins.** The 11th symposium in the series was held 17-21 May 2004 in the Washington, D.C. area, USA. The 12th symposium is now being planned for 21-26 May 2007 in Istanbul, Turkey.
- **IUPAC International Congress on Crop Protection Chemistry.** The 10th congress in the series was held 4-9 August 2002 in Basel, Switzerland. The 11th congress is scheduled for 6-11 August 2006 in Kobe, Japan <www.iupac2006.jtbcom.co.jp>.

Second, DCE was heavily involved in the organization of a special one-time international symposium coordinated by SCOPE and IUPAC on "Environmental



Dr. Kenneth Racke is currently president (2004-2007) of the Division of Chemistry and the Environment. Racke served the Division as vice president (2002-2003), and was formerly chairman (1995-2001) of the Commission on Agrochemicals and the Environment. His first encounter with IUPAC occurred in 1986 as a graduate student poster presenter at the IUPAC International Congress of

Pesticide Chemistry in Ottawa, Canada. Racke's background and expertise are in the area of pesticide environmental chemistry and impact assessment. He has worked for the agrochemical division of the Dow Chemical Company for the past 16 years, where he currently serves as Global Regulatory Leader. He lives in Indianapolis, Indiana, USA.

Dr. Patrick Holland is currently secretary (1998-2005) of the Division of Chemistry and the Environment. He has been active in IUPAC since attending a commission meeting in 1979 as National Representative. Holland has many years of experience with mass spectrometry and analytical aspects of trace analysis for contaminants in food and environmental samples. For the past several years he has focused his



efforts on the chemistry and analysis of marine biotoxins in seafoods, with an emphasis on LC-MS and QA/QC for trace analytical methods. He lives in Nelson, New Zealand.

Chemistry and the Environment

Implications of Endocrine Active Substances (EASs): Present State-of-the-Art and Future Research Needs.”

The DCE has not been satisfied just to have some group adopt the IUPAC name and then run a conference under local leadership and with token or no IUPAC involvement.

ing significant co-funding from SCOPE as well as a variety of private and government organizations, and in hosting and organizing the conference. The project work was divided into two-phases, with multiple project teams holding preliminary working sessions during 2001, and culminating in the conference during 2002 where the state-of-the-art was reviewed and recommendations to direct research and risk management were debated and finalized. Miyamoto was assisted by DCE members who contributed 5 of the 10 plenary papers to Main Topic 2 “Environmental Fate and Metabolism of Endocrine Active Substances.” A set of eight recommendations was developed for environmental risk management of EASs. The symposium reviewed many other lines of research and reached conclusions and recommendations that are contributing to resolving the significance of EASs to human health and the environment. The full proceedings were published in a special double issue of *Pure and Applied Chemistry* in November-December 2003.

Third, international workshops targeted at developing countries have also been an important component of DCE’s outreach activities. These smaller conferences of 150–350 participants serve to bring together a mix of international experts and local/regional scientists from government, academia, and industry. The conferences create a forum where IUPAC project outcomes can be discussed and applied within the context of local environmental problem areas. The workshops generally involve a range of national and international sponsors and thus also fulfil the need for IUPAC to interact with other agencies in promoting the chemical sciences. These activities have given IUPAC high visibility in countries in which it has traditionally had minimal interactions. Participants from

developing nations often predominate, and the workshops enable IUPAC to contribute directly to changes in practices that lead to improved environmental management or higher-quality food production. Crop protection, air pollution, and food-quality chemistry are three topics for which workshops have been regularly held in various regions. DCE currently has two projects that involve a workshop as one of the key outputs:

- **Workshop on Fats, Oils, Oilseeds Analysis and Production**, 6–8 December 2004, Tunis, Tunisia (project #2002-011-2-600). Organized by IUPAC and AOCs in cooperation with the Tunisian Office National de l’Huile, the American Soybean Association, and the International Olive Oil Council. <www.aocs.org/meetings/analysis>
- **International Workshop on Crop Protection Chemistry in Latin America**, 4–17 February 2005, San Jose, Costa Rica (project #2003-013-1-600). Organized by IUPAC in cooperation with the Costa Rica Ministry of Agriculture, the University of Costa Rica, and CropLife Latin America. <www.altcomcr.net/crop-prot-chemistry>

Current Projects

DCE currently has about 20 projects underway. In addition to those mentioned above, the following projects provide a flavor of the range of topic areas being addressed within DCE’s program:

- **Impact of Transgenic Crops on the Use of Agrochemicals and the Environment** (project #2001-024-2-600), task group chairman Gijs Kleter. There is a high degree of interest in this topic area because of the current scientific, regulatory, political, and public perception issues surrounding transgenic crops. The project provides an opportunity for IUPAC to take important leadership roles in promoting the importance of chemistry in molecular biology.
- **Standardization of Analytical Approaches and Analytical Capacity-Building in Africa** (project 2004-017-1-500), task group chairman Walter Benson. This is a cooperative project with the IUPAC Analytical Chemistry Division, International Organization for Chemical Sciences in Development, and Association of Official Analytical Chemists International. Uganda and Kenya are the initial focus of the project, with Nigeria, South Africa, and Mozambique of future

IUPAC's Division VI Takes Stock and Looks Ahead

interest in conjunction with an ongoing World Bank project. The project aims to build regional analytical laboratory capabilities in relation to monitoring and enforcement of international trade standards. Key activities will involve lectureships, local workshops, visiting scientist apprenticeships, and laboratory equipment procurement initiatives.

- **Remediation Technologies for Removal of Arsenic from Water and Wastewater** (project #2003-017-2-600), task group chairman Hemda Garelick. The impetus for this project is the affect on the health of millions of people caused by reduced standards for arsenic in water and the already apparent toxicity of water supplies in several regions caused by natural arsenic contamination. There is an urgent need to reduce arsenic levels in drinking water supplies and, in some areas, irrigation waters. Although several technologies have been proposed, there has not been sufficient in-depth evaluation, especially for routine treatment of large volumes of water; agreement on assessment criteria is also lacking. This project will address these important issues in collaboration with WHO and other IUPAC initiatives in this area. The project will result in a report whose recommendations will be presented at a future workshop organized by IUPAC in the Asian subcontinent.

Challenges and Future Directions

To remain effective and maintain relevance, DCE will need to address current strengths and weaknesses of the IUPAC approach, and seek a way forward that takes advantage of the opportunities while avoiding looming threats. The Division Committee recently took the first steps toward developing a long-range plan by completing a SWOT analysis of the DCE program.

- **Strengths**—Global audience; international viewpoint and approach rather than a national/regional one; good productivity; important issues for society; credibility; networks (individuals, institutions, cross discipline); flexibility for projects to garner external funding; breadth (scholarly, applied, workshops/symposia); subcommittees helping bring new issues, projects and people to IUPAC.
- **Weaknesses**—Token in-house funding; heavy reliance on enthusiasm and availability of volunteers; very high dependence on single individuals

(i.e., project task group leader); lack of direct influence for project performance and completion; limited peer-review process in place for final project reports (in absence of the commissions); lack of recognition for individual efforts; low impact/visibility for PAC; lack of a long-range strategic direction for division.

- **Opportunities**—Increase credibility through more rigorous project review (planning, outputs); increase inputs from developing countries; more emphasis on food chemistry (functional foods); increase partnerships with other international organizations; seek more interdivisional projects; make better use of electronic media (Web, e-mail); attract funding from multiple sources to make viable projects.
- **Threats**—Loss of relevance; losing intellectual property to collaborating organizations; having division direction driven by randomly submitted project proposals; having lead on key areas taken by other organizations; slowness in addressing key issues of interest and project areas; not reaching the intended audience; conflicts of interest in funding decisions; inability to define and measure success.

The ultimate aim of the Division Committee, which will be further wrestling with these topics at the Beijing General Assembly, is to develop a long-range strategic plan. The division is already taking action to reinvigorate the area of food chemistry. Through past mergers of divergent commissions (oils and fats with food-borne mycotoxins) and subsequent disbandment of the Food Chemistry commission, the current level of expertise for food chemistry available to IUPAC has been depleted and food chemistry-related project activities have been dramatically reduced. A subcommittee has been appointed to organize a discussion forum in Beijing to reexamine the IUPAC approach to food chemistry, and chart a new direction that brings to bear the traditional strengths of the Union and contemporary issues and problems related to food chemistry. 🍷

Patrick Holland <patrick.holland@cawthron.org.nz> and Kenneth Racke <kracke@dow.com> are respectively the DCE secretary and president.



www.iupac.org/divisions/VI

Element 111 is Named Roentgenium

Following the 80th meeting of the IUPAC Bureau in Bled, Slovenia, the name roentgenium for the element of atomic number 111, with symbol Rg, was officially approved on 1 November 2004. The IUPAC Council, at its meeting at Ottawa, Canada in 2003, delegated the authority to approve a name for the element of atomic number 111 to the Bureau.

In 2003, a joint IUPAC-IUPAP Working Party (JWP) confirmed the discovery of element number 111 by the collaboration of Hofmann et al. from the Gesellschaft für Schwerionenforschung mbH (GSI) in Darmstadt, Germany (*Pure Appl. Chem.*, 2003, **75**, 1601-1611). The most relevant experiment resulted from fusion-evaporation using a ^{64}Ni beam on a ^{209}Bi target, which produced a total of six decay chains of alpha-emitting nuclides following the presumed formation of $^{272}\text{Rg} + n$ (S. Hofmann et al., *Z. Phys. A*, 1995, **350**, 281-282); S. Hofmann et al., *Eur. Phys. J. A*, 2002, **14**, 147-157).

In accordance with IUPAC procedures, the discoverers proposed a name and symbol for the element. The proposed name was roentgenium, with symbol Rg. The Inorganic Chemistry Division Committee then recommended this proposal for acceptance. The provisional recommendation has now successfully passed expert examination and the prescribed period of public scrutiny. This proposal lies within the long-established tradition of naming elements to honor famous scientists.

On 8 November 1895, Wilhelm Conrad Roentgen discovered X-rays, a new type of rays to which he gave this name in view of their uncertain nature. Their use has

subsequently revolutionized medicine, found wide application in technology, and heralded the age of modern physics, which is based on atomic and nuclear properties. In 1901, six years after their discovery, the benefit of X-rays to humankind was so evident that Roentgen was awarded the first Nobel Prize in



For some time before Nov/Dec 1895, scientists had been reporting bizarre apparitions when they electrified the thin gas in vacuum tubes. On the Sunday before Christmas 1895, Wilhelm Conrad Roentgen invited his wife Bertha into the laboratory and took a shadow-graph of the bones of her hand with her wedding ring clearly visible. This is one of the most famous images in

photographic history and propelled Roentgen in no time into international celebrity. The medical implications were immediately realized and the first images of fractured bones were being made by January 1896 even though none yet knew what the mystery rays were. The radiograph reproduced here is of the hand of Albert von Kolliker, made at the conclusion of Roentgen's lecture and demonstration at the Wurzburg Physical-Medical Society on 23 January 1896. (Credit AIP Emilio Segre Visual Archives, Lande Collection)

Physics. Element 111 was synthesized exactly 100 years after Roentgen's discovery. To honor Wilhelm Conrad Roentgen, the name roentgenium was proposed for the element with atomic number 111.



www.iupac.org/news/archives/2004/naming111.html

From Macro to Poly

At its division meeting in Paris in July 2004, prior to the IUPAC World Polymer Congress (Macro 2004), Division IV voted to change its name from Macromolecular Division to Polymer Division. The change was ratified by the Bureau at its meeting in Bled, Slovenia, on 2 October 2004.

The Macromolecular Division was formed in 1967 to "extend the activities of the former Commission on Macromolecules and of the Polymer and Plastics Section."¹ The structure of the new division was devised under the guidance of Otto Wichterle (Prague), the then Chairman of the Commission of Macromolecules. Initially, within Division IV, only

¹ Roger Fennell, *History of IUPAC 1919-1987*, Blackwell Science Ltd., Oxford, 1994, p. 238.



Credit: AIP Emilio Segre Visual Archives, Lande Collection

*Wilhelm Conrad Roentgen
(b. 1845–d. 1923)*



Commission IV.1 on Macromolecular Nomenclature was formed. "All other work was done by Working Groups, ad hoc Committees, and individual experts."¹

Following the initial macromolecular emphasis, Commission IV.2 on Polymer Characterization and Properties was formed in 1975. Gradually, over the years, Division IV's work has expanded away from individual macromolecules towards polymers as substances and materials. However, the molecular areas of activity still retain their importance.

Under the present, project-based operating system of IUPAC, Division IV has structured itself to cover the following areas of activity, each organized by one, two, or three coordinators:

- Structure-Property Characterization of Commercial Polymers
- Modeling of Polymerization Kinetics and Processes
- Macromolecular Terminology
- Macromolecular Nomenclature (in collaboration with Division VIII)
- Molecular Characterization of Polymers
- Developing Polymer Materials Systems
- Polymer Education

Of these areas, only Macromolecular Nomenclature and Molecular Characterization of Polymers deals with individual macromolecules. Division IV's concerns are now much broader than when it was formed 37 years ago. In general terms, the division's present work deals with macromolecules, polymer substances and materials, and polymer-based materials. Hence, the members of Division IV have chosen to rename it "Polymer Division." The name is simple and straightforward, and adequately describes Division IV's activities, now and into the foreseeable future.

 www.iupac.org/divisions/IV

Young Chemists to the 40th IUPAC Congress

The 40th IUPAC Congress will be held 14-19 August 2005 in Beijing, China, on the theme "Innovation in Chemistry." To encourage **young chemists** to participate in this unique congress, the organizers have established two different programs, both offering travel assistance. The first program is especially targeted to young scientists from develop-

ing and economically disadvantaged countries; the second is open to chemists from any country. For each program respectively, about 30 and 20 awards of up to USD 1500 will be made available to qualified candidates to cover some or all of their Congress registration fees and/or some or all of their travel expenses.

Applications from candidates under age 40 are welcomed. Applications may be submitted directly to the address below. There is no specific application form, but applicants are required to provide:

- a letter of application
- a brief CV
- a confirmation of their current status and affiliation
- a publication list
- a letter of support from the appropriate department head, dean, or laboratory supervisor
- an abstract of the poster or paper to be presented at the Congress
- estimates of the economy airfare to and from the Congress

The deadline for receipt of applications is **28 February 2005**. Award of travel support will automatically include acceptance of a candidate's abstract. As all abstracts are subject to adjudication, those candidates whose applications for travel support are unsuccessful could still have their abstracts accepted. All applicants will be notified of the outcome by 15 March 2005.

Applications should be sent to:

Prof. Xibai QIU
Secretary, IUPAC-05
c/o Chinese Chemical Society
No 2, Beiyijie St., Zhongguancun
Beijing 100080, China
E-mail: qiuxb@iccas.ac.cn
Fax/Tel: +86-10-62568157
<www.iupac-congress05.org.cn>
<www.ccs.ac.cn/IUPAC2005.htm>

Note: This opportunity for young chemists to participate in the 40th Congress is independent of the Young Observers program (described in the Nov-Dec 2004 *CI*), which is coordinated by the USA, UK, and IUPAC Secretariat.

Simples and Compounds: A Proposal

by Claudio Giomini, Mario E. Cardinali, and Liberato Cardellini

The term “element” is often employed in place of “elementary substance,” not only in everyday speech, but also in scientific literature.^{1,2} There are some books where “elements and compounds” occur throughout the text.³ While almost no one makes the mistake of referring to diamond as an element, many people mistakenly refer to substances such as diatomic oxygen (strictly, dioxygen), crystalline silicon, or electrolytic copper as elements.

Significant misunderstandings can follow. For instance, when references are made to hydrogen—so important to solving energy and pollution problems—much confusion exists among people on the street about the availability of this resource. The confusion largely arises from uncertain and imprecise terminology:

... when references are made to hydrogen—so important to solving energy and pollution problems—much confusion exists among people on the street about the availability of this resource.

On Earth, there is plenty of element hydrogen in the form of water and many other abundant hydrogenated compounds, but the elementary substance hydrogen—molecular hydrogen (strictly, dihydrogen), the one which would

be most relevant in that context—is almost completely absent. Like in Coleridge’s “Rhyme of the

ancient mariner”: hydrogen, hydrogen, every where, nor any tiny bubble to burn.

Even for substances with monatomic molecules, such as the noble gases, it would be preferable to avoid designating them as “elements.” The latter term should just mean the whole set of nuclides characterized by the same atomic number, independent of the kind of structure they happen to take part in, and the chemical nature of the atoms they happen to be bonded to, if any.

To mark a clear-cut distinction between elements and elementary substances, we suggest replacing the latter term with “simple substances,” a term that, according to Scerri⁴ and Laing,⁵ was employed, with this meaning, by Mendeleev himself.⁶ Therefore, we are not proposing the introduction of a new, but the revival of an old, term with noble origins. Besides avoiding confusion, and in spite of its alchemistic flavor, this term would also form a well-matched couple with “compound substances,” so that, by transforming the adjectives into substantives, the rather objectionable “elements and compounds” could be replaced by the more acceptable “simples and compounds.”

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Send your comments by e-mail to <edit.ci@iupac.org>

Heat Capacity of Liquids: Critical Review and Recommended Values for Liquids with Data Published Between 2000 and 2004

This project aims to update and extend two publications that contained recommended data on liquid heat capacities for mostly organic compounds: *Heat Capacity of Liquids: Critical Review and Recommended Values*, published in 1996 as Monograph No. 6 of the *Journal of Physical and Chemical Reference Data*, and its Supplement I, published in 2001 in the *Journal of Physical and Chemical Reference Data*, vol. 30, pp. 1199–1689.

Experimental data on heat capacities of pure liquid organic, and some inorganic compounds, published in the primary literature between 2000 and 2004 will be compiled and critically evaluated, and recommended values will be provided. Recommended data, supplemented with assessments of their uncertainty and presented in terms of parameters of correlating equations for temperature dependence of heat capacities, will be developed by critical assessment of calorimetrically determined heat capacities published in the primary literature.

The project, consisting of the monograph and its two supplements, will also provide an exhaustive survey of the literature for all isobaric and saturation heat capacities. The overall number of compounds in the database of recommended data will exceed 2000.

The project is being developed by Vlastimil Ruzicka and Milan Záborský from the Institute of Chemical Technology, Prague, Czech Republic; Zdenka Kolská from the University of J.E. Purkyne in Ústí nad Labem, Czech Republic; and Eugene S. Domalski, formerly from the National Institute of Standards and Technology, Gaithersburg, Maryland, USA.

For more information, contact Task Group Chairman Vlastimil Ruzicka <vlastimil.ruzicka@vscht.cz>.



www.iupac.org/projects/2004/2004-010-3-100.html

Compendium of Targets of the Top 100 Commercially Important Drugs

Published articles on drug discovery frequently point out that most commercially successful pharmaceutical agents act on a relatively small number of molecular

targets. However, there does not appear to be a resource where compiled target information is readily available in a single location.

The goal of this project is to provide a resource containing the following information on the targets of the most commercially important drugs: type of target (enzyme, receptor, etc.); brief description of relevance to disease or indication; reference to knockout information, if available; reference to structural information, if available; listing of the marketed drugs that interact with the target along with potency and relevant selectivity information. It is anticipated that this compendium will be a valuable teaching and reference source for the drug discovery community.

For more information, contact Task Group Chairman John Proudfoot <jproudfo@rdg.boehringer-ingenheim.com>.



www.iupac.org/projects/2004/2004-025-1-700.html

Critically Evaluated Propagation Rate Coefficients for Free-Radical Polymerization of Water-Soluble Monomers Polymerized in the Aqueous Phase

This project, which emerged from the activities of the IUPAC Subcommittee on Modeling of Polymerization Kinetics and Processes, represents a continuation of the successfully completed projects on benchmark propagation rate coefficients of free-radical polymerization of styrene, of a series of methacrylates, and of butyl acrylate. The IUPAC-recommended technique of pulsed-laser-initiated polymerization in conjunction with size-exclusion-chromatography (PLP-SEC), encounters several difficulties when applied to polymerization of water-soluble monomers in the aqueous phase. For this reason, precise information on individual rate coefficients for this type of polymerizations is lagging behind information on hydrophobic monomers.

In recent years, several groups around the world have successfully started to apply the PLP-SEC technique to water-soluble monomers and to identify the effects of solvent, ionic strength, and pH (in case of ionizable monomers) on propagation rate. The project aims to provide reliable propagation rate coefficients of water soluble monomers within extended ranges of

Project Place

polymerization conditions. The availability of critically evaluated rate coefficients should assist both the optimization of technical polymerization processes and the mechanistic understanding of radical polymerization in the aqueous phase.

The project team, coordinated by Igor Lacík from the Polymer Institute of the Slovak Academy of Sciences in Bratislava, is composed of experts in free-radical polymerization, polyelectrolytes, and polymer characterization, from academia and industry.

For more information, contact the Task Group Chairman, Igor Lacík <igor.lacik@savba.sk>.



www.iupac.org/projects/2004/2004-034-1-400.html

Capacity Building in the Mathematical Sciences

by Keith Moffatt

In order to promote international scientific and technological activities that contribute to the benefit and well being of society, the International Council for Science (ICSU) offers a grants program to support collaborative scientific initiatives of the ICSU "family." One such ICSU-supported project is the African Institute for Mathematical Sciences (AIMS) in Muizenberg, a suburb of Cape Town, South Africa. This important new initiative in capacity building in science education will provide an Africa-based solution to African problems, facilitated by the international scientific community.

A Workshop on Capacity Building in the Mathematical Sciences took place in Muizenberg from 13-17 April 2004, during the first year of academic activity at AIMS. Its objectives were to consider the problems associated with capacity building in mathematics and its applications in the physical and biological sciences and technology, and the manner in which AIMS is approaching these problems. Participants also considered how the Internet can be used to promote teaching and research in Africa and in the developing world.

The workshop was sponsored by the International Union of Theoretical and Applied Mechanics (IUTAM) on the basis of a grant awarded by ICSU under the 2004 ICSU grants program. IUTAM's proposal to ICSU was supported by the following scientific and national members of ICSU, many of which were represented at

the workshop: IUGG (International Union of Geodesy and Geophysics), IMU (International Mathematical Union) IUPAP (International Union of Pure and Applied Physics), IUPAC, IUA (International Union of Astronomy), TWAS (Third World Academy of Science), and national members South Africa, Brazil, Netherlands, Egypt, and UK.

The workshop included a number of survey lectures of outstanding quality from representatives of the above international scientific unions. In addition, there were a number of additional attendees from the local community at some of the invited lectures.

Countries Represented and Number of Participants

African States	Invited Participants	Students of AIMS
Algeria	1	3
Angola	1	
Benin	1	
Botswana	2	
Cameroon		3
DRC	1	3
Ghana	1	1
Kenya	1	2
Lesotho	1	
Madagascar	1	
Malawi	2	
Morocco	1	1
Mozambique	1	
Nigeria		6
South Africa	29	3
Sudan	1	4
Tunisia	1	
Tanzania	1	
Zambia	1	
Zimbabwe		3
Total	48	30
Non-African Countries		
France	3	
Netherlands	1	
UK	8	
USA	4	
Total	16	

Project Place

The program consisted of a sequence of invited lectures interspersed with discussion sessions, and presentations from AIMS students.

Following are some of the diverse lecture topics:

- “Understanding the Universe,” Neil Turok (Cambridge UK, and AIMS)
- “Mathematics and the Figure of the Earth,” Charles Merry (UCT, South Africa; IUGG)
- “The Physical Chemistry of Time,” Peter Atkins (Oxford UK; IUPAC)
- “Marvelous Mathematical Models,” Hassan Aref (Virginia Tech. USA; IUTAM)
- “Mathematics of the Internet,” Frank Kelly (Cambridge UK)
- “NEPAD and the Future of Science in Africa,” Neville Arendse (Dept of Science and Technology, SA)
- “Listening to the Inside of the Sun,” Douglas Gough (Cambridge UK; IAU)
- “Numbers: The Shape of Things to Come,” Martin Taylor (Manchester UK; Royal Society)
- “From Galileo to Convexity: Some Key Ideas in Structural Mechanics,” Jean Salencon (Ecole Polytechnique, Palaiseau, France; IUTAM and Academie des Sciences)
- “Dynamics of an Emerging Infectious Disease: HIV,” Gareth Witten (AIMS Executive Committee)

Discussion sessions were conducted on subjects such as the use of the Internet for teaching mathematics and issues related to establishing an African Network for Teaching and Research. A final session was devoted to key questions relating to future actions; the following important questions and issues were extensively discussed:

- i) How can the Internet be best exploited in the teaching of mathematics at the school level in Africa? Toni Beardon described the steps being taken by AIMSSEC (the AIMS Schools Enrichment Centre) to provide Web-based teaching for schools <www.aims.ac.za/aimssec>.
- ii) A draft proposal to establish an African Mathematical Institutes Network (AMI-Net) was introduced by Neil Turok. This proposal is motivated by the need to overcome numerous obstacles presently faced by African scientists: low morale; low publication rates; lack of innovative capacity; poor quality of teaching affecting future generations; brain drain of top students, teachers, and researchers from Africa; waste of resources due to

lack of coordination across the continent; and dependency on the developed world for expensive software. The proposal, involving a number of partner organizations including AIMS, will exploit the window of opportunity offered by:

- support of the New Partnership for Africa's Development
- potential for rapid communication and collaboration available through the Internet, provided fast links can be established
- access to open-source and free software available through the Internet
- increase in potential bandwidth provided by new submarine cables and satellite services

This AMI-Net proposal will focus on postgraduate research and teaching in the mathematical sciences, and will link centers of excellence across the African continent.

- iii) The AIMS Postgraduate Diploma is at present a one-year course in the mathematical sciences. There has been some discussion concerning its possible extension to a two-year Master's qualification, a development that would be popular with the students themselves. The general consensus of opinion, however, was that the AIMS Diploma fulfills a unique role at present, that its teaching style is highly innovative and should not be constrained by the regulations that would be unavoidable for a degree course, and that it should be allowed to develop in its present form for at least a few years, before any fundamental change is envisaged.
- iv) There was also discussion of the possibility of setting up “sister institutes” at other African locations: North, East, West and Center. Again however, the consensus view was that the “pan-African” character of AIMS was one of its great strengths, and regional African Institutes could have a countereffect. Fritz Hahne warned that great effort was needed to establish a new institute like AIMS, and that this could not be undertaken lightly; nevertheless, if such initiatives were to emerge in other parts of Africa, AIMS would give every encouragement. However, the idea of a linked network of centers of excellence (based on existing universities) received more support in the discussion.

Keith Moffatt <moffatt@tourmesol.lps.ens.fr> is the president of IUTAM and a professor at the Ecole Normale Supérieure in Paris, France.

Provisional Recommendations

IUPAC Seeks Your Comments

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

Nomenclature of Cyclic Peptides

These recommendations extend rule 3AA-19.5 of the Nomenclature and Symbolism for Amino Acids and Peptides (Recommendations 1983) to cover all classes of cyclic peptides. They include rings generated from an acyclic peptide by formation of a peptide or ester bond, by a disulfide link, or by a new carbon-carbon, carbon-nitrogen, nitrogen-oxygen, or carbon-sulfur bond (not esters or amides). These new bonds are indicated by the prefix anhydro, cyclo, or epoxy, or combinations of them. The inclusion of modified standard amino acids or amino acids not related to standard amino acids is considered. Any stereochemistry generated by ring formation is indicated using standard organic conventions.

Comments by 31 March 2005

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www.iupac.org/reports/provisional/abstract04/moss_310305.html

Nomenclature of Organic Chemistry

For nomenclature purposes, a structure containing at least one carbon atom is considered to be an organic compound. The formation of a systematic name for an organic compound requires selection and then naming of a parent structure. This basic name may then be modified by prefixes, infixes, and, in the case of a parent hydride, suffixes, which convey precisely the structural changes required to generate the compound in question from the parent structure. In contrast to such systematic names, there are traditional names which are widely used in industry and academic circles. Examples

are acetic acid, benzene, and pyridine. Therefore, when they meet the requirements of utility and when they fit into the general pattern of systematic nomenclature, these traditional names are retained.

A major new principle is elaborated in these recommendations. The concept of “preferred IUPAC names” is developed and systematically applied. Up to now, the nomenclature developed and recommended by IUPAC has emphasized the generation of unambiguous names in accord with the historical development of the subject. In 1993, due to the explosion in the circulation of information and the globalization of human activities, it was deemed necessary to have a common language for use in legal situations, with manifestations in patents, export-import regulations, environmental and health and safety information, etc. However, rather than recommend only a single “unique name” for each structure, we have developed rules for assigning “preferred IUPAC names,” while continuing to allow alternatives in order to preserve the diversity and adaptability of the nomenclature to daily activities in chemistry and in science in general.

This book (Recommendations 2004) covers and extends the principles, rules and conventions described in two former publications: *Nomenclature of Organic Chemistry*, 1979 Edition, and *A Guide to IUPAC Nomenclature of Organic Compounds*, Recommendations 1993. In a few instances, the 1979 rules and the 1993 recommendations have been modified to achieve consistency within the entire system. In case of divergence among the various recommendations, Recommendations 2004 prevail.

Comments by 31 March 2005

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www.iupac.org/reports/provisional/abstract04/favre_310305.html

Properties and Units in the Clinical Laboratory Sciences. Part XVIII. Properties and Units in Clinical Molecular Biology (IUPAC Technical Report)

P. Soares de Araujo et al.

Pure and Applied Chemistry

Vol. 76, No. 9, pp. 1799-1807 (2004)

Basic research in biology and medicine and innovations in laboratory methodology have greatly increased the range of properties available to medical practitioners to help them in diagnosis, treatment, and prevention of disease. The increase in variety of properties examined is now such that the individual physician has insight into or understanding of only a limited number of properties offered to him from the various clinical laboratory specialties.

In the laboratory, local terms (jargon) may be well understood among colleagues, but they are not appropriate for communication with the outside world. Likewise, a laboratory and its local community of users, such as hospital or community physicians, may use a "local dialect" of the language of clinical laboratory sciences that is well understood by all concerned, but when the communication possibilities are wider, even transnational, risks of serious misunderstanding arise. It is, therefore, essential to promote clear, unambiguous, meaningful, and fully informative communication.

Coherence of statements made within and between medical specialties and uniformity in structure of presentation is an objective to be actively pursued. This will facilitate the transfer of information across sociolinguistic barriers. The purpose of this document is to apply the IUPAC-IFCC (International Federation of Clinical Chemistry and Laboratory Medicine) recommended syntax structures for request and report, providing formats and names of properties observed in the domain of medical molecular biology, and to facilitate unequivocal written or electronic communication between health care professionals.

For identification of genes, the "approved names" given in the HUGO [Human Genome Nomenclature Database <www.gene.ucl.ac.uk/nomenclature>], in the form of symbols, have been used except for symbols of mitochondrial genes. (Variations in mitochondrial genes and chromosomes are not dealt with in this technical report.) The use of symbols rather than names is

in contrast to previous reports for other medical domains where names have been applied systematically. This is because the names of genes are often very extensive and of limited value to the nonspecialist. Admittedly, the symbols also are of limited direct informative value, but they are gaining increasing general application and hence meaningful connotation.

One of the main points of this paper is the recognition that any report of a variation of a nucleic acid sequence should include the identity of the sequence referred to. For this purpose, reference is given to "Nomenclature for the description of sequence variation" elaborated by Prof. Stylianos Antonarakis and Dr. Johan T. den Dunnen [7 March 2001; <http://archive.uwcm.ac.uk/uwcm/mg/docs//mut_nom.html>].

The list of properties shown in this document comprises the list of symbols for components as given in the HUGO as of 24 September 2003. This list, which is an integral part of this technical report, can be accessed at <www.iupac.org/publications/pac/2004/7609/7609x1799.html>.

Since the list of properties contains more than 16 000 entries, it is not suitable for printing on paper. The online version contains links to databases that allow the reader to obtain information about the selected genes. Frequently updated versions of the listing can be obtained at <<http://dior.imt.liu.se/cnpu>>, the official C-NPU site, also from <www.labinform.dk/English/download_uk.asp> the listing can be downloaded as an Excel file or HTML file.



www.iupac.org/publications/pac/2004/7609/7609x1799.html

Compilation of k_0 and Related Data for NAA in the Form of Electronic Database (IUPAC Technical Report)

V.P. Kolotov and F. De Corte

Pure and Applied Chemistry

Vol. 76, No. 10, pp. 1921-1925 (2004)

This report describes the principles underlying a comprehensive electronic database that contains data essential for calculation of analytical results from neutron-activation analysis (NAA). The database is available through IUPAC. The method used is a comparator method called the k_0 method, where k_0 is a dimensionless factor that is experimentally measured with high

Making an imPACT

accuracy for more than 130 isotopes and that makes use of the gamma spectroscopic line for an analyte isotope relative to a gold comparator. The database contains recommended values for k_0 and other relevant nuclear data.

The conventional method of quantitative reactor neutron-activation analysis (NAA) is based on the relative method of standardization with the use of suitable reference materials. By optimal selection of reference materials, various interference effects (nuclear, measurement, etc.) may be neglected due to compensation. At the same time, the relative method of NAA has a number of restrictions: limited number of suitable reference samples, often nonoptimal for NAA with respect to concentration of the certified elements; difficulties in performing panoramic analysis; unavailability for determination of "unexpected" elements, etc.

To expand the versatility of NAA, standardless approaches based on mathematical modeling of all steps of analysis have been suggested and developed

since the end of the 1960s. The "absolute" (parametric) method did not achieve broad popularity because of its inherent limitations, which led to lower accuracy. That is why attention was paid to the development of alternative comparator methods that combine the flexibility of "absolute" with the accuracy of relative standardization. The essence of a comparator method consists in co-irradiation of the analyzed samples with a suitable element of known mass (comparator), and combining this with the results of gamma-ray spectrometry. Various precalibrations and nuclear data enable one to compute the concentration of any element via the comparator.

The database is available in different file formats, such as Access97 and Access2000. The architecture of the database supports traceability of future data updating or appending, which implies easy recomputation of analytical data using any set of data, either the latest or previous one.

 www.iupac.org/publications/pac/2004/7610/7610x1921.html



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Ionic Polymerization

J. W. Mays and R. F. Storey, editors
Macromolecular Symposia, Vol. 215
Wiley-VCH, 2004, pp. 1-393
ISBN 3-527-31048-7

This volume contains key papers presented at the **International Symposium on Ionic Polymerization**, held 30 June–4 July 2003 in Boston, Massachusetts, under the auspices of IUPAC. This meeting featured a series of invited and contributed papers and posters, covering the areas of anionic, cationic, and related polymerization processes. Attendees included most of the leading experts in this field, from academia and industry, as well as a significant number of younger scientists and students. The papers deal with these polymerization systems in the broadest sense, with contributions ranging from new syntheses to mechanistic studies to applications.

Following is a sampling of the paper topics that appear in this issue:

- “Aluminate and Magnesiate Complexes as Propagating Species in the Anionic Polymerization of Styrene and Dienes,” by Alain Deffieux, Larisa Shcheglova, Anna Barabanova, Jean Marc Maréchal, Stephane Carlotti
- “Design and Synthesis of Functionalized Styrene-Butadiene Copolymers by Means of Living Anionic Polymerization,” by Mayumi Hayashi
- “Novel Cationic Ring-Opening Polymerization of Cyclodextrin: A Uniform Macrocyclic Monomer with Unique Character,” by Masato Suzuki, Osamu Numata, Tomofumi Shimazaki
- “Wavelength Flexibility in Photoinitiated Cationic Polymerization,” by Yusuf Yagci
- “Ring-Opening Polymerization of the Cyclic Ester Amide Derived from Adipic Anhydride and 1-Amino-6-hexanol in Melt and in Solution,” by Thomas Fey, Helmut Keul, Hartwig Höcker
- “Recent Developments in the Ring-Opening Polymerization of ϵ -Caprolactone and Derivatives Initiated by Tin(IV) Alkoxides,” by Ph. Lecomte, F. Stassin, R. Jérôme

 www.iupac.org/publications/macro/2004/215_preface.html

Polymers

P. Supaphol and S. Tantayanon, editors
Macromolecular Symposia, Vol. 216
Wiley-VCH, 2004, pp. 1-306
ISBN 3-527-31049-5

The biennial **Pacific Polymer Conference** is the official conference co-hosted by the Pacific Polymer Federation (PPF) and the polymer organization of the host country. The PPF was founded in 1987 to encourage and facilitate interactions among polymer organizations of member countries from the Pacific region.

Current country members are Australia, Canada, Chile, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Singapore, Taiwan, Thailand, the United States (ACS and APS), and Vietnam. Since the establishment of the PPF, the Pacific Polymer Conference has already taken place on eight occasions.

The most recent Pacific Polymer Conference, held 24–27 November

2003 in Bangkok, Thailand, was a tremendous success in terms of the number of scientific contributions—around 440 oral and poster presentations—and the number of attendees—around 350 from 31 countries. The scientific programs of the conference consisted of one symposium on hydrogels and nine sessions on functional and synthetic polymers, natural and green polymers, polymer blends and composites, polymer colloids and

interfaces, polymer engineering, processing, and characterization, polymer crystallization and structural development during processing, elastomers and rubbers, macromolecular architecture, and industrial and imaging polymers.

The selected papers presented in this special volume of *Macromolecular Symposia* are representatives of the quality and scientific merit of all of the contributions to the PPC-8.

 www.iupac.org/publications/macro/2004/216_preface.html



Bookworm

Green Chemistry in Russia

Green Chemistry in Russia, the latest book in the *Green Chemistry* series produced by the Subcommittee on Green Chemistry, is now available. Previous titles in this series include *Green Chemistry in Africa* and *Green Chemistry in Latin America*.

Written in Russian, the book presents the topic in an easily understandable way and provides examples

from ongoing work in the field of green chemistry. The book will be disseminated in Russia and the former USSR republics, such as Byelorussia, Ukraine, Kazakhstan, and Uzbekistan.

Pietro Tundo, Valery Lunin, and Ekaterina Lokteva were co-editors of the book. Chapters were written by well-known specialists from different regions of Russia, including Far East, Siberia, Ural, Russian North, and Moscow. The chapter topics reflect dif-

ferent aspects of green/sustainable chemistry that are of the most importance to each region.

It is hoped that the publication of this book will accomplish the following:

- attract and enhance attention towards green/sustainable chemistry in general
- encourage students to specialize in the field of green/sustainable chemistry
- improve understanding of the importance of green/sustainable chemistry between industrial chemists
- elucidate the importance of the development of Green/Sustainable Chemistry in Russia and former USSR countries

Green Chemistry in Russia has been published by INCA, and is available online at <venus.unive.it/inca/publicazioni.htm>.



www.iupac.org/divisions/III/303

Radioactivity, Ionizing Radiation, and Nuclear Energy

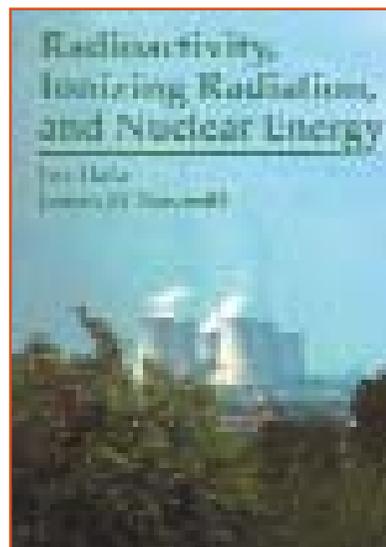
Jiri Hala and James D. Navratil
Konvoj, Brno, Czech Republic, 2003
ISBN 80-7302-053-X

This textbook focuses on basic information about radioactivity, nuclear reactions, properties and measurements of ionizing radiation, nuclear energy, and technology, and their environmental aspects. The core of the book proceeds from the authors' lectures in nuclear chemistry and environmental radioactivity at the School of Science, Masaryk University, Brno, Czech Republic, and in actinide and radiochemistry at Clemson University, Anderson, South Carolina.

The authors' original intention was to write a basic textbook appropriate for introductory courses related to the science of radioactivity, ionizing radiation, and nuclear technology. While working on the manuscript it was felt that topics related to nuclear energy, biological risk of ionizing radiation for man, and environmental aspects of radioactivity and nuclear energy, including management of radioactive wastes, continue to be popular among a wider public. Therefore, the respective sections have been expanded to provide university students and a wider readership with answers to often asked topical questions that continue to be the target of frequently unjustified criticism from opponents of nuclear and radiation technologies.

The subjects covered in this book have their foundations in a blend of physics, biology, chemistry, and engineering. In relation to radiation and nuclear technologies, the subjects of economics, psychology, and politics also come into play.

For information on availability, e-mail <konvoj@konvoj.cz>.



Conference Call

Coordination and Organometallic Chemistry of Germanium, Tin, and Lead

by Keith Pannell

The 11th International Conference on the Coordination Chemistry and Organometallic Chemistry of Germanium, Tin, and Lead, ICCOC-GTL-11, was held in Santa Fe, New Mexico, USA, 27 June–2 July 2004. Held for the first time in the USA, the conference was attended by representatives from 20 countries. The program featured 55 oral presentations—arranged by tradition in single session—and 50 poster presentations, which were displayed for the duration of the meeting.

The opening speaker, Phil Power (University of California, Davis, CA, USA), set the high standard for the meeting with a description of the alkyne analogs of the heavier group 14 elements, including a proposed new description of the bonding in these delightful compounds involving diradicaloids. To close the meeting, Klaus Jurkschat (University of Dortmund, Germany) introduced, *inter alia*, exciting new Sn(I) species coordinated to transition metals. Other outstanding lectures involved mechanistic studies on digermenes (Kim Baines, University of Western Ontario, Canada), the utility of organotins (OTs) for organic synthesis (Francisco Pulido, Universidad de Valladolid, Spain), and a rousing introduction of new oligomers of Zintl-type Ge_9 clusters (Slavi Sevov, Notre Dame, USA).

Germynes, stannylenes, and plumbylenes continue to surprise and stimulate the chemistry community. Just as Willie Leigh (MacMaster University, Ontario, Canada) had rationalized, and regularized, the previous diverse characterizations of species such as Me_2Ge , Christian Drost (Universität Leipzig, Germany) reported a stimulating group of beautiful new materials (Ge—Sn—Pb) that exhibit progressive properties that require new ways of thinking in this established area.

Advances in molecular analysis are always eagerly awaited. Rudi Willem (Free University of Brussels, Belgium) presented insight into the utility of solid-state NMR for analysis of insoluble OT-containing polymers involving a new magic-angle spinning (MAS) technique. This involves addition of small amounts of

solvent that locally lubricates the OT functionality with remarkable results in terms of resolution and quantification. For true solid-state analysis, X-ray crystallography, the non-sporting technique, still rules the roost. Edward Tiekink (Singapore) outlined an approach for improving the prediction of the myriad crystal packing forms that abound in the structures of OTs. The contributions of Raymundo Cea-Olivares (Universidad Autonoma de Mexico), Ravi Shankar (IIT Delhi, India), Junzo Otera (Okayama, Japan), Dominic Wright (Cambridge, UK), and Vitapali Chandrasekhar (IIT Kanpur, India) further demonstrated that some rationality in this area can be forthcoming.



A region near Santa Fe where meeting participants took an excursion.

The materials chemistry of the elements was writ large at the meeting. Mark Allendorf (Sandia National Laboratory, New Mexico, USA) presented the first thermodynamic approach to understanding the very empirical formation of tin oxide glass coatings using OT precursors. Des Cunningham (Galway, Ireland) introduced a simple but effective method-

ology for producing soluble SnO_2 for direct application, without the need for the organic radical functionalities. Thierry Toupance and Bernard Jousseume (Université Bordeaux, France) both demonstrated the delightful utility of alkynyltins for creative materials chemistry.

Important contributions to the meeting concerned the biological impact of tin and lead compounds. Whereas organoleads have been all but abandoned for commercial usage, little is truly known concerning the reasons for their health risks. Hilary Godwin (Northwestern, Evanston, IL, USA) detailed the capacity of lead to replace Zn in proteins resulting in improper folding and inappropriate binding to DNA. In a similar vein, Margaret Whalen (Tennessee State, TN, USA) outlined in compelling detail the surprising prevalence of tributyltin in human blood samples and its ability to effectively retard the functioning of human natural killer cells. On the other hand Marcel Gielen (Brussels, Belgium) demonstrated that other OTs could be among the most effective anti-tumor compounds. Such are the diverse and perplexing properties of OTs! Jim Becvar (University of Texas at El Paso, TX, USA) presented a teasing glimpse of the possible role of luminescent bacteria for the environmental analysis of complex OT mixtures. John Batt (Atofina, Inc.) presented the industry approach and

Conference Call

methodology for understanding the environmental impact of the large current production of OTs.

With the established icons in the field, Lappert, Veith, Roesky, Barrau, Cowley, Tokitoh, West, and Wo Wo du Mont (the only person to participate in all the GTL gatherings), and newcomers Chauhan, Konstantinos, and Layfield et al., all contributing significant new findings, the meeting was an intellectual success. In addition, the ability of graduate students/postdoctoral fellows to present posters plus a 5-10 minute oral overview was well received. The next gathering—to be chaired by Des Cunningham and to be held 2-6 July 2007 in Galway, Ireland—will include a similar opportunity and will follow the same pattern of a single oral session with posters.

The proceedings of the meeting are to be published in *Applied Organometallic Chemistry*.

Keith Pannell <kpannell@utep.edu> is a professor of chemistry at the University of Texas at El Paso and was chairman of ICCOC-GTL-11.

Photochemistry

by Silvia E. Braslavsky

The XX-IUPAC Symposium on Photochemistry, which took place 17-22 July 2004 in Granada, Spain, was a real success. Unlike previous symposia, the scientific organizers, chaired by Scientific Chairman Miguel A. Miranda (Universidad Politécina de Valencia), chose to hold several parallel sessions. This enhanced the attractiveness of the symposium, since it allowed for coverage of the large number of fields in which photochemistry is involved nowadays.



The conference's social program included a trip to Granada's Alhambra Castle.

The symposia attracted 505 participants from 37 countries and it featured 12 plenary conferences (one by the 1986 Nobel-Prize winner John Polanyi) plus 39 invited oral contributions. The parallel sessions accommodated 105 oral communications. In addition, there were 361 posters, which were displayed the entire week due to ample space in the very comfortable Granada Conference Center. The invited oral contributions and the oral presentations were organized in 13 workshops:

1. Photochemistry Towards Nanotechnology and Photochemical Devices
2. Photochemistry of Biomacromolecules
3. Organic Photochemistry
4. Femtochemistry
5. Development and Applications of Incoherent Excimer Radiation Sources
6. Applied Photochemistry
7. Photochemical Electron Transfer
8. Photochemistry in Heterogeneous Media
9. Single Molecule/ Single Cell Spectroscopy
10. Polymer Photochemistry
11. Photophysical and Photochemical Approaches in the Control of Toxic and Therapeutic Activity of Drugs (jointly sponsored by the European Photochemical Association and the European Society for Photobiology)
12. Theoretical Methods in Photochemistry
13. Supramolecular Photochemistry

Fortunately, many younger scientists and scientists from less-developed countries were able to attend the symposia because conference organizers offered 105 fellowships, which covered room and lodging in a university facility and waived part of the registration fee. The symposium was sponsored by IUPAC, the University of Granada and the Polytechnical University of Valencia, the Spanish Council for Scientific Research, the Andalusian Government, and the Spanish Ministry of Science and Technology. Additional financial support was provided by the Granada Savings Bank and several Japanese companies listed in the Symposium web page <www.ugr.es/~xxiupacs/iupacxx.htm>.

The lack of financial support from American science agencies, for the participation of their own photochemists, was reflected in the very low number of scientists from the USA who participated in the symposium. Of the 19 American attendees—the large majority of whom were senior scientists—four were

Conference Call

plenary lecturers and four invited lecturers. Unfortunately, there appears to be a trend of decreasing numbers of symposia participants from the USA, which is undoubtedly a real loss for international cooperation and exchange.

Apart from the large number of Spanish scientists and students, the nation with the largest number of participants was Japan. The active participation of a large number of Japanese colleagues, as well as the financial support of Japanese companies, has been a constant with the IUPAC-supported photochemistry symposia.

In the spirit of IUPAC, the symposium covered basic research as well as applied aspects of photochemistry, such as microlithography, solid-state luminescent devices, photoproduction of antimalarial drugs, photochemical and spectroscopic aspects of polymer studies, phototherapies, photocatalysis, and more. The scientific level of the symposium was very high as evidenced by very intense discussions after the presentations. The posters sessions were very lively, with the students and young researchers presenting their data with great enthusiasm.

The highest prize in the photochemical community, the Porter Medal, awarded jointly by the three photochemical societies (European Photochemical Association, Inter-American Photochemical Association, and Asian Photochemical Association) was awarded to Graham R. Fleming, from the University of California at Berkeley, who delivered one of the plenary lectures titled "Photosynthetic light harvesting."

During the symposium, there was a lunch meeting of the Subcommittee on Photochemistry of IUPAC's Division on Organic and Biomolecular Chemistry. Diverse problems associated with the various projects handled by the Subcommittee were discussed.

The efficiency and hospitality of the Spanish committee (headed by Bartolomé Quinteros, University of Granada) and the local organizers of the symposium were extraordinary. The social program enabled participants to enjoy the splendid buildings and monuments of Granada, in particular the Alhambra Castle and its gardens, remains of a great era in which science and tolerance flourished.

The next IUPAC-sponsored Symposium on Photochemistry is scheduled to be held 2-6 April 2006 in Kyoto, Japan, which will mark the first symposium held outside Europe. The scientific chairman is Masahito Irie, Department of Chemistry and Biochemistry, Graduate School of Engineering,

Kyushu University, Fukuoka, Japan.

Silvia E. Braslavsky <braslavskys@mpi-muelheim.mpg.de> was the IUPAC representative at the XX-IUPAC Symposium on Photochemistry. She is the German Representative on the IUPAC Organic and Biomolecular Chemistry Division, chairman of the Subcommittee on Photochemistry, and member of the Advisory subcommittee of the Physical and Biophysical Chemistry Division.

Polymers and Organic Chemistry

by Karel Jerabek



The 11th International Conference on Polymers and Organic Chemistry 2004 (POC'04) was held 18-23 July 2004 in Prague, Czech Republic. The Polymers and Organic Chemistry (POC) conferences have a long tradition and they are organized in two-year intervals in various countries around the world (1982 Lyon, France; 1984 Lancaster, UK; 1986 Jerusalem, Israel; 1988 Barcelona, Spain; 1990 Kyoto, Japan; 1994 Venice, Italy; 1996 Wroclaw, Poland; 1998 Maa'ale Hachamisha, Israel; 2000 Tianjin, China; 2002 San Diego, USA).

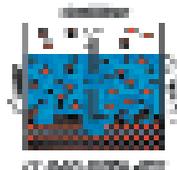
The POC conferences have been the most important meetings of specialists engaged in research and/or application of functional polymers (e.g., polymer supports for reagents, catalysts or drugs, polymer adsorbents, etc.) The Prague conference, which featured 26 oral lectures, 9 keynote lectures, 8 plenary lectures, and 80 posters, attracted 115 scientists from 36 countries. This was probably the largest number of participating countries in the history of the conference series.

Topics covered included catalysis, polymers in medicine and biochemistry, separation science, electro-sensitive functional polymers, environmental chemistry, and synthesis of novel functional polymers. The breadth, scope, and quality of the contributions provided a clear demonstration that functional polymers' roles in organic chemistry continue to expand, a promising sign for the next conference, POC'06, scheduled to be held near Nagoya, Japan, in 2006.

Professor Karel Jerabek <kjer@icpf.cas.cz> is a senior research scientist in the Department of Diffusion and Separation Processes at the Institute of Chemical Process Fundamentals, in Prague, Czech Republic. Jerabek served as the conference chairman of the 11th International Conference on Polymers and Organic Chemistry.

Solubility Phenomena

by Heinz Gamsjäger



The 11th International Symposium on Solubility Phenomena—Including Related Equilibrium Processes was held 25–29 July 2004 at the University of Aveiro in Portugal, under the auspices of IUPAC. The extended title reflects the broadening of scientific interest and competence, resulting from the merger of the solubility and equilibrium data groups of IUPAC.

The joint organizers of the symposium were the University of Aveiro, the Portuguese Chemical Society, and the IUPAC Subcommittee on Solubility and Equilibrium Data. Sponsors of the symposium were University of Aveiro, CICECO-Centro de Investigação em Materiais Cerâmicos e Compósitos; US Army-Research, Development, and Standardization Group UK; Fundação para a Ciência e Tecnologia; Fundação Oriente; Fundação Luso-Americana para o Desenvolvimento; Câmara Municipal de Aveiro; Universidade de Coimbra; John Wiley and Sons; Rota da Luz, and Millennium BCP. The symposium was chaired by Maria Clara Magalhães, with assistance from members of the local organizing committee, Maria Celina Silva, and Luísa Barroso Oliveira, all of whom are from the Department of Chemistry, University of Aveiro.

The Subcommittee on Solubility and Equilibrium Data of IUPAC's Division V (Analytical Chemistry) met over the two days prior to the symposium, with Heinz Gamsjäger (Austria) presiding as the chair.

The symposium attracted 151 participants from 25 countries: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Hungary, Iran, Ireland, Israel, Japan, Poland, Portugal, Russia, Serbia and Montenegro, South Africa, Spain, Switzerland, and the USA. Of the participants, 40 were from Portugal, 10 of whom were secondary school teachers, and 109 were from other countries.

The opening ceremonies were presided over by the vice rector of the University of Aveiro, Francisco Vaz. Welcoming remarks were given by Clara Magalhães, symposium chair, Paulo Claro, the representative of the Portuguese Chemical Society, Artur Silva, president of the Chemistry Department of the University of Aveiro, and Heinz Gamsjäger, the representative of IUPAC.

Dana Knox (USA) gave the opening plenary address, entitled "Solubilities in Supercritical Fluids," a topic that served as an excellent introduction to the

industry-oriented part of the symposium. The concluding plenary address was given by Peter Williams (Australia), whose fascinating lecture on "Solutions in the Big Laboratory: Towards a Model for Metals at the Earth's Surface" evoked a standing ovation after an elucidating demonstration.

The symposium was organized in nine sessions: Industrial Applications, Ionic Liquids and Electrolytes, Modelling and Computational Aspects, Gas-Liquid Equilibria, Solution Thermodynamics, Polymers and Nonelectrolytes, Experimental Determination of Solubilities, Teaching Aspects of Solubility, and Environmental and Geochemical Applications. Four plenary and nine invited lectures, as well as 27 contributed papers made up these sessions. During afternoon and morning sessions, 53 posters were presented. The contributions themselves covered a wide spectrum of solubility phenomena, from fundamentals of phase equilibria to new data and modelling of solubility processes to many applications, including the field of radioactive waste disposal.

The participation of delegates not only from universities but also from industry and from institutes studying waste management provided a stimulating application-oriented atmosphere. For the sessions "Modelling and Computational Aspects" and "Experimental Determination of Solubilities," roundtable discussions were organized that were well received by the audience, especially the student participants.

The two IUPAC poster prizes were given to **Mara G. Freire** (Department of Chemistry University of Aveiro) for posters on "Oxygen Solubility in Perfluorocarbon Emulsions" and "Water Solubility in Pure Perfluorocarbons," and **Ada Villafáfila García** (Department of Chemical Engineering, Technical University of Denmark, Lyngby) for a poster on "Solid-Liquid-Vapour Equilibrium for Sparingly Soluble Salts Found in Natural Waters." The poster prize sponsored by John Wiley and Sons, consisting of the book *The Experimental Determination of Solubilities* was given to Martin Slavík (Department of Chemistry, Technical University of Liberec, Czech Republic).

The plenary and invited lectures given at the symposium are to be published in *Pure and Applied Chemistry* under the editorship of Clara Magalhães, Glenn Hefter, and Heinz Gamsjaeger. All other presenters were invited to submit their papers to *Monatshefte für Chemie/Chemical Monthly*.

Symposium participants enjoyed an art exhibition

Conference Call

at the University of Aveiro called "Solubility: Art and Science," which featured works of invited artists and art teachers and postgraduate students from the university. Participants were delighted by Portuguese folk music at the welcome-get-together and a Portuguese guitar concert at the symposium dinner. The half-day excursion to Coimbra University was most interesting; the wonderful day ended with a delicious dinner at Restaurante Mugasa in Sangalhos. Accompanying persons enjoyed excursions to Costa Nova beach and the Natural Preserve of S. Jacinto, a boat trip through the channels of the Ria de Aveiro, visits to the Aveiro Museum, the China Clay Museum of Vista Alegre, and the Maritime Museum in Ílhavo.

The 12th ISSP will be held in July 2006 in Freiberg, Saxonia, Germany.

Professor Heinz Gamsjäger <gamsjaeg@unileoben.ac.at> served as the IUPAC representative at the 11th International Symposium on Solubility Phenomena. He is a professor in the Department of Physical Chemistry at the University of Leoben in Austria.

Chemistry in Africa

by Graham E. Jackson

The 9th International Chemistry Conference in Africa was held in Arusha on the slopes of Kilimanjaro, Tanzania, 2-7 August 2004. Its theme was "Chemistry Towards Disease and Poverty Eradication," and as such, concentrated on problems relating to Africa. The conference was sponsored by, among others, IUPAC, the Royal Society of Chemistry, the American Chemical Society, and Bruker SA.

Over 100 delegates attended the conference from 60 countries, the largest contingent coming from Botswana. Lectures were held in the Arusha International Conference Centre, which is also home of the International Criminal Tribunal for Rwanda; hence, security was tight.

Zabein Mhita, deputy minister for science, technology and higher education, delivered a speech on behalf of the minister, setting the overall tone for the meeting. In her address, Mhita emphasized the lack of productivity of chemical publications in Africa, citing a 1997 survey in which the vast majority proved to originate either from South Africa or Egypt. She regretfully noted that 29 African countries produced no cited publications at all. She then proceeded to outline a strategy to rectify the situation that included collaboration between African countries and the establish-

ment of regional centers of excellence. Many discussions about the way forward for chemistry in Africa continued throughout the conference.

The scientific program included the following lectures:

- "Structure, Function, Synthesis and Application of Germination Stimulants for Seeds of the Parasitic Weeds, *Striga* and *Orobanche*," Bianne Zwanenburg, University of Nijmegen
- "International Collaboration in Drug Discovery and Development from Natural Sources," Gordon Cragg, Natural Products Branch, Development Therapeutics
- "Environmental Chemistry: Practice and Applications," Isai Urasa, Hampton University, USA
- "The Fascinating Chemistry of Some Constituents of Tanzanian Indigenous Plant Species," Mayunga Nkunya, University of Dar es salaam
- "Chemical and Biological Studies of Some Medicinal Plants," Mohammed Mosihuzzaman, University of Dhaka, Bangladesh
- "Towards Metal Ion Sequestration via Molecular Imprinted Polymer Technology," Donnati Moshia, University of Dar es Salaam
- "Economic Drug Discovery and Rational Medicinal Chemistry," Kelly Chibale, University of Cape Town
- "Fine Particulates and Human Health: A Neglected Research Area in Africa," Shen Wandiga, University of Nairobi
- "The Chemistry and Pharmacology of the Cameroonian *Dorstenia* Species," Berhanu Abegaz, University of Botswana

Most of the presentations focused on natural product chemistry and its relevance to fighting diseases endemic to Africa. Kelly Chibale, gave a particularly good lecture in which he emphasized the need for collaboration. Proceedings of the conference are to be published in *Pure and Applied Chemistry*.

After the conference, a CHEMRAWN XII Workshop was held in which Ikenna Onyido presented a report on *Chemistry, Sustainable Agriculture, and Human Well Being in Sub-Saharan Africa*. This report will be the subject of a future feature article in *CI*.

Graham E. Jackson <Jackson@SCIENCE.uct.ac.za> is a professor in the Department of Chemistry at the University of Cape Town in South Africa. He served as the IUPAC representative at the 9th International Chemistry Conference in Africa.

Heteroatom Chemistry

by Irina Beletskaya

The **7th International Conference on Heteroatom Chemistry (ICHAC-7)** was held 21–25 August 2004 in Shanghai, China. The conference was organized by the Chinese Chemical Society, Shanghai Institute of Organic Chemistry, State Key Laboratories of Organometallic Chemistry and Elemento-Organic Chemistry, and Shanghai Society of Chemistry and Chemical Industry. The conference chairman was Lixin Dai and the co-chairman was Yong Tang.

Approximately 250 participants from many countries took part in the conference, including a large number of students predominantly from the Asian region. The program consisted of 8 plenary lectures, 1 keynote lecture, 38 invited lectures, 56 oral presentations, and nearly 120 posters.

The subject of this conference was in some ways

unique, since the concept of heteroatom includes almost all the elements of the periodic table. Hence, the conference featured an exceptional diversity of topics in which the problems of organic and inorganic chemistry, life science, and material science were reflected and intertwined. The following major themes were included in the conference: Organocatalysis, Heteroatom Chemistry Directed Towards Organic Synthesis,

Mechanistic and Structural Aspects of Heteroatom Chemistry, New Heteroatom-Containing Materials, Biologically Relevant Heteroatom Chemistry, and Supramolecular Chemistry of Heteroatom.

Participants pointed out that the conference enlarged their scientific horizons and introduced them to new and important things that were far from their own fields of study. It was particularly gratifying that the plenary lectures were exciting enough that they evoked interest among participants in issues not directly connected with their fields of study.

Many new findings were disclosed in the invited lectures and oral presentations. The enormous poster session featured many enthusiastic and highly trained young people, especially from the host country.

It is impossible to mention all the important contributions, but most of them will be published in *Pure and Applied Chemistry*. Following are a few highlighted lectures, which are representative of the quality of material presented at the conference:

- “Phosphoryl Transfer Enzymes and Hypervalent Phosphorus Chemistry,” Robert R. Holmes, University of Massachusetts
- “Strongest but Gentlest: New Acids for Organic and Inorganic Chemistry,” Christopher A. Reed, University of California at Riverside
- “Synthetic Methodologies Using Tertiary Phosphines as Nucleophilic Catalysts,” Xiyan Lu, Shanghai Institute of Organic Chemistry, CAS
- “Functional Oligothiophenes as Advanced Molecular Electronics Materials,” Tetsuo Otsubo, Hiroshima University
- “Recent Advances of Molecular Material in the Organic Solid Laboratory, CAS,” Dao-Ben Zhu, Institute of Chemistry, CAS
- “Catalytic Routes to Rings, Chains, and Macromolecules based on Inorganic Elements,” Ian Manners, University of Toronto
- “Recent Developments in the Chemistry of Low-Coordinated Organophosphorus Compounds,” Masaaki Yoshifuji, Tohoku University
- “Cyclopentadienyl and Ferrocenyl Chemistry of Some p-Block Elements,” Peter Jutzi, University of Bielefeld
- “Design of Heterocyclic Ligands for Asymmetric Catalysis,” Andreas Pfaltz, University of Basel

The conference was well organized and allowed the participants to acquaint themselves not only with the recent progress in the field of heterocyclic chemistry, but also with the advances of science in China, as well as with amazingly beautiful and rapidly upcoming city of Shanghai.

The 8th IUPAC International Conference on Heteroatom Chemistry will be held in Riverside, CA, hosted by Prof. Christopher A. Reed of University of California at Riverside in 2007.

Irina Beletskaya <beletska@org.chem.msu.su> is professor at Moscow State University; she was IUPAC representative at the ICHAC-7, and former president (1989–91) of the IUPAC Organic Division.



(From left to right) Group of the previous chairmen of ICHAC meetings: Prof. Ohno (1st, 1987, Kobe, Japan), Prof. Block (2nd, 1989, Albany, NY, USA), Prof. Kim (3rd, 1992, Riccione, Italy), Prof. Baines (5th, 1998, London, Canada), Prof. Mikolajczyk (6th, 2001, Lodz, Poland) and Prof. Dai (7th, 2004, Shanghai, China). (Courtesy of Li Xin Dai and Yong Tang, organizers of ICHAC-7)

Physical Organic Chemistry

by Guo-Zhen Ji

From 15–20 August 2004, the **17th IUPAC Conference on Physical Organic Chemistry (ICPOC17)** was held in Shanghai, China. Approximately 200 participants from 21 countries gathered to present and discuss new findings from the past two years in all aspects of physical organic chemistry. ICPOC17 also emphasized interactions with other fields of science (e.g., mechanistic ideas and studies as driving forces in synthetic chemistry, physical organic chemistry of organized and living systems, and theoretical studies in organic chemistry).

The meeting featured 14 plenary and 17 invited lectures, 41 contributed lectures, and 53 posters. The topics presented at the five-day meeting emphasized the diversity of modern research in physical organic chemistry, with particular emphasis on applying physical-organic-chemistry concepts to biological systems and material sciences. A key topic was biological systems as shown by the following lecture titles:

- “DNA Charge Transport Chemistry and Biology,” Jacqueline K. Barton, California Institute of Technology, USA
- “An Alternate View of Enzyme Catalysis,” F. Menger, Emory University, USA
- “Morphological Chameleons: The Remarkable Aggregation Behavior of Sugar-Based Gemini Amphiphiles,” Jan B.F.N. Engberts, Gronigen, the Netherlands
- “Efficiency in Intramolecular and Enzymic Catlysis,” Anthony J. Kirby, Cambridge, UK
- “Why Did Biological Complexity Emerge? Building Bridges Between Chemistry and Biology,” Addy Pross, Ben Gurion University, Israel
- “Bioantioxidants: From Chemistry to Biology,” Zhong-Li Liu, Lanzhou University, China

Another key topic was materials, as reflected in the following lectures:

- “Advanced Opto-Electronics Materials by Fullerene and Acetylene Scaffolding,” F. Diederich, ETH, Switzerland
- “Tooling Up for Nanoworld: The ‘Magic’ of Molecular Machines,” Dave Leigh, Edinburgh, UK
- “Cyclodextrin-Based Catlysis, Molecular Reactors and Machines, and Microelectronic Devices,” C.J. Easton, Australian National University, Australia
- “Octupolar Molecules for Nonlinear Optics,” Bong Rae Cho, Korea University, Korea

The basic foundation of physical organic chemistry was presented in the following lectures:

- “The Single Transition State Model Appropriate for the Fundamental Reactions of Organic Chemistry,” V.D. Parker, Utah State University, USA
- “Cycloproparenyl Anions-from Model to Real Systems,” Mirjana Eckert-Maksic, Rudjer Boskovic Institute, Croatia
- “Synthetic Porphyrinoid Chemistry,” Atsuhiko Osuka, Kyoto University, Japan
- “Kinetics of Electrophile-Nuceophile Combinations: A General Approach to Polar Organic Reactivity,” Herbert Mayr, University of München, Germany

The local organizer also arranged a fantastic social and cultural program for the participants, including a welcome mixer and visits to Hangzhou, Suzhou, and Zhouzhuang (beautiful cities and towns near Shanghai). Shanghai sightseeing and an acrobatic show were also included in this program. Most participants from Western countries had the opportunity to enjoy traditional and ancient Chinese culture, and acquire an understanding of modern developments occurring in China. Yet, delegates who had not been in China recently were amazed at the modern city of Shanghai, which provides an efficient system of public transportation together with modern expressways to accommodate the rapid increase in private automobiles. The city also features modern housing for many of the 17 million inhabitants, much urban greenery, and many parks. However, rapid growth comes with a price and Shanghai is making efforts to ease environmental problems resulting from rapid industrialization and urban growth, and to preserve historic districts in the city.

The 18th Conference is scheduled for Warsaw from 20–25 August in 2006.

Guo-Zhen Ji <jigz@mail.sioc.ac.cn> is a professor at the Shanghai Institute of Organic Chemistry, the Chinese Academy of Sciences. He is a member of the Subcommittee on Structural and Mechanistic Chemistry and was the chair of the local organizing committee for ICPOC-17.



This symbol was adopted as the logo of all conferences on physical organic chemistry in China in 1981. It symbolizes the very essence, nature, or conceptual foundation of physical organic chemistry, namely, “detachment and attachment, donor and acceptor.” They are all related to the movement of electrons.

Conference Call

Biological Polyesters

by George Guo-Qiang Chen

The **International Symposia on Bacterial Polyhydroxyalkanoates, Biological Polyesters, Biodegradable Polyesters (ISBP)**, started 16 years ago in Toronto, Canada, and have been well established on a biennial basis since then. So far, ISBP conferences have been held in 1990 (Sitges, Spain), 1992 (Göttingen, Germany), 1994 (Montreal, Canada), 1996 (Davos, Switzerland), 1998 (Saitama, Japan), 2000 (Cambridge, USA) and 2002 (Münster, Germany). In 2004, the symposium was held 22–28 August at Tsinghua University in Beijing, China. It was sponsored by the Natural Sciences Foundation of China and the Li Ka-Shing Foundation, Rohm and Haas Company, Kaneka, P&G, and Metabolix. It was co-hosted by Tsinghua University and Shantou University. IUPAC representative, Stanislaw Penczek (Polish Academy of Sciences), opened the symposium on the first day of the meeting.

The IUPAC-ISBP 2004 was attended by 248 participants, including 100 from overseas. There were over 50 participants from industry, representing companies such as Cargill Dow, Procter & Gamble, BASF, Fisher Chemicals, Lantian Group, Kimberly-Clark, Kaneka, Mitsui Chemicals, Metabolix, Tephra, and many other material-related companies from China. The symposium mainly discussed basic biopolyesters research and industrialization around the globe. Prominent scientists working on polyhydroxyalkanoate research, including A. Steinbüchel (Univ. of Münster, Germany), Y. Doi (RIKEN, Japan), A.J. Sinskey (MIT, USA), S.Y.

Lee (KAIST, Korea), F. Sreenc (Univ. of Minnesota, USA) and Y. Poirier (Univ. Lausanne, Switzerland), gave lectures on their respective research. Industrial speakers discussed their efforts to push this class of novel materials into the market.

During the symposium, industry representatives were invited by the 2008 Beijing Olympic Preparative Committee to showcase “green” materials based on biopolyesters. The 2008 Beijing Olympic games will promote the concept of “Green Olympics, High Tech Olympics.” The preparative committee is evaluating materials that can be used to fit the green concept, such as biodegradable materials for some of the packaging applications. ISBP 2004 provided a unique opportunity for the committee to learn about companies that are involved in the development and application of bio- and environmentally degradable materials based on sustainable resources.

As petroleum supplies diminish, efforts to develop sustainable resources for the material industries are intensifying. This is especially the case with China, which has become the second largest oil importing country in the world. Global research and development efforts to find novel materials from sustainable resources will create an even greater demand for biopolyester research.

The ISBP2004 International Organizing Committee has decided to hold the next symposium at the University of Minnesota, St Paul, USA.

George Guo-Qiang Chen (chengq@mail.tsinghua.edu.cn) is a professor at the Tsinghua University in the Department of Biological Sciences and Biotechnology in Beijing, China.



Moore's Law at 40: Chemistry and the Electronics Revolution

A Symposium

12–13 May 2005

Chemical Heritage Foundation

315 Chestnut Street, Philadelphia, Pennsylvania, USA



On the 40th anniversary of Moore's law and the 50th anniversary of the arrival of silicon—in the form of the silicon transistor—in Silicon Valley, the Chemical Heritage Foundation (CHF) will hold an evening public lecture and all-day symposium to reflect upon and assess the most revolutionary technology of the past century—a technology that is critically enabled by chemical science and engineering.

For more information and to register, log on to
<www.chemheritage.org/events/moores-law-40.htm>.

Where 2B & Y

Nanotechnology

20-25 February 2005
Luxor, Egypt



Nanotechnology has officially been recognized as the leading technology of the 21st century. The **International Conference on Nanotechnology: Science and Application [NanoTech Insight'05]**, to be held 20-25 February 2005 in Luxor, Egypt will provide a forum for nanoscientists to discuss the latest developments in this state-of-the-art field. The meeting will emphasize the multidisciplinary nature of nanoresearch. Chemists, biologists, physicists, and engineers are all invited to participate and contribute on the following topics: single molecules, self-assembly, bionanotechnology nanomaterials (includes carbon nanotubes), nanofabrication, supramolecular chemistry, molecular modeling, and simulations at the nanoscale.

As a burgeoning new field, young scientists and students, and female researchers in particular, are

strongly encouraged to participate. It is hoped through involvement in such a meeting, young researchers, under the guidance of leading scientists, will be inspired to understand, pursue, and enhance the goals of nanotechnology. Researchers from developing countries are also strongly encouraged to participate; they will receive significant reductions in registration fees. As a rapidly developing science with many applications, nanoscience offers many great promises for the future. The organizers of NanoTech Insight, hope that this promised future can be shared among all human communities.



See calendar on page 39 for contact information

 www.nanoin sight.net

Nuclear Analytical Methods

17-22 April 2005
Rio de Janeiro, Brazil

The **8th International Conference on Nuclear Analytical Methods in the Life Sciences (NAMLS)** will be held 17-22 April 2005, in Rio de Janeiro. This is one of a series of international conferences organized to promote the development and application of nuclear and related analytical methods in the life sciences.

The life sciences encompass a broad range of disciplines including agriculture, biology, biochemistry, botany, bio (medical) technology, cosmetics, environment, food process-

ing, life systems technologies, medicine, microbiology, nutraceuticals, pharmaceuticals, radiation biology, virology, and zoology. Nuclear analytical methods involve techniques utilizing properties of the nucleus (like activation analysis, radiotracer studies, mass spectrometry), or combinations of nuclear and electronic properties (like NMR, Mössbauer spectroscopy). X-ray fluorescence spectrometry and PIXE are related techniques that use similar equipment.

The conference will address the following life-science topics:

- innovation and metrology
- human and animal health and disease
- environmental studies
- food chain

Following is a list of selected lecture titles:

- "Clinical and Occupational Medicine Using Nuclear Analytical Methods," Vladimir Zaichik
- "Country Reports on the Use of Nuclear Analytical Methods in the Life Sciences in Latin America," Matthias Rossbach
- "Environmental Sources of Pollution," Paulo Artaxo
- "Health Effects of Aerosols," Reynaldo Luiz Victoria
- "Low-Level Trace-Element Analysis," Rolf Zeisler
- "Metrology As Applied to the Use of Nuclear Analytical Methods in the Life Sciences," Kaj Heydorn
- "Nuclear Analytical Methods in Agriculture and in Food Research and Production," Epaminondas S.B. Ferraz
- "Quality Control and Reference Materials," Robert Greenberg
- "Trace Elements in Health and Disease with Special Reference to Selenium," Dietrich Behne

See calendar on page 39 for contact information

 www.cena.usp.br/namls8



Where 2B & Y

Macromolecules

4-9 June 2005
Réduit, Mauritius

The **8th UNESCO School and IUPAC Conference on Macromolecules** is to be held in Réduit, Mauritius, 4-9 June 2005. The overall objectives of the school/conference are to provide training to students, young researchers, and non-technical persons in environmentally sound polymer science and technology that are relevant to the future development of Greater Africa. The school/conference will enable young scientists to relate polymer science to their country's needs, provide a forum for presenting their research work, and encourage networking to foster research collaborations.

The two-day UNESCO School (4-5 June 2005) will train students and non-scientists (economists, business strategists, etc.) in the basic principles of macromolecular science. Topics to be discussed include green chemistry, biopolymers, biodegradable polymers, and polysaccharides, all of which are of prime interest to the region vis-à-vis sustainable development. Lectures at the UNESCO School will be given in English and French, a first of its kind in the world.

The IUPAC Conference on Macromolecules (6-9 June 2005) will follow the UNESCO School and offer more advanced technical-level presentations and discussions. Leading polymer scientists from Europe, the

United States, Africa, and Asia will participate in this conference. In all, approximately 50 talks (7 plenary, 18 invited lectures and 25 contributed papers) as well as 80 poster presentations are planned. Topics to be covered include biopolymers/biodegradable polymers/polysaccharides, polymers in health and medicine, food/textiles, functional materials, and advanced characterization techniques.

Important Dates:

Deadline for abstract(s): 31 March 2005

Deadline for registration: 31 March 2005

Financial support: The Organizing Committee will provide partial support to graduate students and young scientists from the least developed countries of the African region and Indian Ocean islands. Financial support will cover full registration fees, local accommodation, and partial airfare. Selection will be based on scientific excellence of the proposed contributions from young scientists and graduate students. Applications (see conference Web site) should be addressed to Dr. D. Jhurry, Department of Chemistry, University of Mauritius (djhurry@uom.ac.mu).

See calendar on page 39 for contact information

 www.sun.ac.za/unesco/Conferences/MAURITIUS/HOMEPAGE2005.htm

Carotenoids

17-22 July 2005
Edinburgh, Scotland

The **14th International Symposium on Carotenoids** will be held at the Edinburgh International Conference Center in the heart of the city of Edinburgh, Scotland, from 17-22 July 2005. The scientific program will include plenary lectures by invited speakers, sessions devoted to selected carotenoid topics (see below), and poster display sessions.

The main objective of the symposium is to cover new developments and advances in the carotenoid field, to describe and evaluate new methods, and to increase understanding of the mechanisms underlying the natural functions, actions, and applications of

carotenoids. The main themes of the symposium are as follows:

- Carotenoids and Health: a series of themed sessions focusing on protection against disease; the eye; molecular and cellular processes; and nutrition
- Carotenoid Oxidation and Breakdown Products and Metabolites
- Carotenoids in Photosynthesis
- Carotenoid Biosynthesis
- Commercial Production and Applications
- Carotenoids and Nature: ecology, etc.
- Molecular Interactions of Carotenoids

See calendar on page 40 for contact information

 www.carotenoidsociety.org



Learning Science

28 August-1 September 2005
Barcelona, Spain



One of the goals of the European Science Education Research Association (ESERA), which was formed in 1995, is to enhance the quality and range of research training in science education in Europe. With this in mind, a conference on **Contributions of Research to Enhancing Students' Interest in Learning Science** will be held 28 August-1 September 2005 in Barcelona, Catalonia, Spain.

This specific aim of the event is to highlight particular research achievements dealing with declining interest among European students in studying science and technology. Strong interest in this topic has led to a major increase in research that could provide a useful guide for future political decisions. The conference is an ideal opportunity to promote and facilitate the dissemination, transfer, use, and assessment of these research results. Another aim of the conference is to support the career development and training of new generations of researchers in the field of science education.

The ESERA-CRESILS Conference has a specifically designed program for early researchers that includes general conferences, presentations by expert researchers, presentations by the early researchers in guided sessions, workshops, open discussions with editors of research journals, and presentation of relevant EU programs.

The conference subtopics are as follows:

- reconceptualizing the curriculum
- enhancing scientific thinking

- fostering scientific attitudes towards natural phenomena and everyday
- teaching models and strategies for science classes
- developing research-based innovative units for primary, secondary, or university students
- developing research-based proposals for teacher education and professional development
- assessment of science learning
- integrating communication and informatics technologies in science curriculum
- communication and public understanding of science
- understanding the nature of science; epistemological and historical patterns
- environmental education and field studies
- informal and non-formal contexts for science teaching and learning
- science and the media, images of science
- model/based teaching and learning
- laboratory/based practices for science teaching and learning
- bridging the gender gap
- science in early childhood

Deadlines

Deadline for proposals: January 2005
Confirmation of proposal acceptance: April 2005
Deadline for advance registration: 15 May 2005
Final program: July 2005

See calendar on page 40 for contact information

 www.esera2005-cresils.net

Molten Salts, Chemistry, and Technology

29 August-2 September 2005
Toulouse, France

Ionic liquids in general include traditional high-temperature molten salts, metal-molten salt systems, glass-forming systems, and novel room-temperature melts. At the **7th International Symposium on Molten Salts, Chemistry, and Technology**, several state-of-the-art applications will be presented that highlight the importance of these ionic liquids in various industries (batteries, nuclear energy, pyrochemical reprocessing of nuclear fuel, synthesis, catalysis, etc.).

Lectures at the symposium will detail and describe

the structure, dynamics, electrochemistry, interfacial, and thermodynamic properties of the relevant experimental methods. Such fundamental concepts are essential for an in-depth understanding of the general physicochemical properties of these Coulomb liquids. Experimental methods for investigating structural, dynamic, electrochemical, thermodynamic, and interfacial properties will be detailed. Techniques for data collection and analysis will also be discussed. This meeting will provide a forum to discuss the transfer of these methods and techniques developed for high-temperature, as well as the more recent room-temperature, melts.

 <http://inpact.inp-toulouse.fr/progep/MS7/>

Where 2B & Y

Boron Chemistry

11-15 September 2005
Sendai, Japan

The **12th International Conference on Boron Chemistry (IMEBORON-XII)** will be held 11-15 September 2005 in Sendai, Japan, under the sponsorship of IUPAC and the COE program of Tohoku University. Major topics include catalytic reactions and catalysts with boron compounds, cluster chemistry of boron and boron complexes, materials using boron, biological activity of boron and supramolecular chem-

istry of boron, and organic synthesis with boron, and others. The program will consist of two plenary lectures, invited lectures, oral communications, short presentations for researchers and students, and poster sessions. H. C. Brown and W. N. Lipscomb, who are Nobel Laureates, have agreed to present plenary lectures.

See calendar on page 40 for contact information

 <http://hanyu.chem.tohoku.ac.jp/~web/IMEBORON>

Polymers for Advanced Technologies

11-14 September 2005, Budapest, Hungary

The **8th International Symposium on Polymers for Advanced Technologies** will be held 11-14 September 2005 in Budapest, Hungary. The program will cover tailor-made polymers, molecular engineering,

designed molecular architecture, optically/electrically/magnetically active polymers/composites, advanced processing methods, micro- and nano-fabrication, and much more.

For more information contact Gyorgy Marosi <gmarosi@mail.bme.hu>.

 www.bme.hu/pat2005

Recent Advances in Food Analysis

2-4 November 2005
Prague, Czech Republic

The International Association of Environmental Analytical Chemistry along with the Department of Food Chemistry and Analysis of the Institute of Chemical Technology (ICT Prague) announce the **2nd International Symposium on Recent Advances in Food Analysis**, to be held 2-4 November 2005 in Prague, Czech Republic. The symposium will be held at the Masaryk College Conference Center.

The previous symposium in this series, held in 2003, was very well attended. The 2005 symposium will be organized according to a matrix that will have cutting-edge analysis technologies on the one hand versus advanced food applications on the other, both being presented by leading scientists through invited lec-

tures and contributed oral and poster presentations. This format should stimulate informal discussions between methodological and application scientists and help to build bridges between entirely different food-related fields. The scientific program will cover both analytical technologies and food analysis applications related to the following topics:

- Residues and Contaminants (pesticides, dioxins, flame retardants, veterinary drugs, toxic elements, etc.)
- Food Processing and Packaging Contaminants (acrylamide, 3-MCPD, plasticisers)
- Natural Toxins (phytotoxins, marine toxins, mycotoxins)
- GM Food and Substantial Equivalence
- Authenticity and Fraud
- Novel Foods, Nutraceuticals, Products from Organic Farming

 www.iaec.ch/food_home.htm

Mark Your Calendar

2 0 0 5

14–17 February 2005 • Crop Protection Chemistry in Latin America • San Jose, Costa Rica

International Workshop on Crop Protection Chemistry in Latin America: Harmonized Approaches for Environmental Assessment and Regulation

<www.iupac.org/symposia/2005/crop-protection-chemistry>

20–25 February 2005 • Nanotechnology • Luxor, Egypt

Nanotechnology: Science and Application (NanoTech Insight '05)

Dr. Mohamed Abdel-Mottaleb, Institute of Physics, TU-Chemnitz, Department of Optical Spectroscopy & Molecular Physics, Reichenhainerstr. 70, D-09107 Chemnitz, Germany

Tel.: +49 0 371 531 4807, Fax: +49 0 371 531 3060, E-mail: mohamed.abdel-motaleb@physik.tu-chemnitz.de

27 February–2 March 2005 • Heterocyclic Chemistry • Gainesville, Florida, USA

6th 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

17–22 April 2005 • Nuclear Analytical Methods • Rio de Janeiro, Brazil

8th International Conference on Nuclear Analytical Methods in the Life Sciences

Prof. Dr. Elisabete De Nadai, Universidade de São Paulo, Centro de Energia Nuclear na Agricultura, Laboratório de Radioisótopos, Caixa Postal 96, CEP 13400-970 Piracicaba, São Paulo, Brazil, Tel.: +55 19 34294655,

Fax: +55 19 34294654, E-mail: lis@cena.usp.br

21–22 April 2005 • Clinical Laboratory • Barcelona, Spain

Third European Symposium on Clinical Laboratory and In Vitro Diagnostic Industry

Dr. Josep Lluís Bedini, Hospital Clínic, Laboratori Core, Barcelona, E-08036 Catalonia, Spain,

Tel.: +34 93 227 98 69, Fax: +34 93 227 93 76, E-mail: jlbedini@clinic.ub.es

9–12 May 2005 • Polymer Blends • Bruges, Belgium

Joint Meeting of the 8th European Symposium on Polymer Blends and Eurofillers 2005

Prof. Philippe Dubois, Service des Matériaux Polymères et Composites, Université de Mons-Hainaut, Place du Parc, 20, B-7000 Mons, Belgium, Tel.: +32 65 373480, Fax: +32 65 373484, E-mail: philippe.dubois@umh.ac.be

4–9 June 2005 • Polymers and Biopolymers • Réduit, Mauritius

8th UNESCO School and IUPAC Conference on Macromolecules: "Polymers for Africa"

Dr. Dhanjay Jhurry, Department of Chemistry, University of Mauritius, Réduit, Mauritius,

Tel.: +230 454 1041 - ext 1472, Fax: +230 465 6928, E-mail: djhurry@uom.ac.mu

20–24 June 2005 • Polymer Systems • Saint-Petersburg, Russia

5th International Symposium on Molecular Mobility and Order in Polymer Systems

Prof. A.A. Darinskii, Institute of Macromolecular Compounds, Russian Academy of Sciences, Bolshoi pr. 31, St. Petersburg, 199004, Russia, Tel.: +7 812 218 8750, Fax: +7 812 218 6869, E-mail: adar@imc.macro.ru

26–30 June 2005 • Polymeric Materials • Prague, Czech Republic

23rd Discussion Conference PMM Current and Future Trends in Polymeric Materials

Prof. Miroslav Raab (Chairman), c/o P.M.M. Secretariat, Institute of Macromolecular Chemistry AS CR, Heyrovského nám. 2 CZ - 162 06 Praha 6, Czech Republic, Tel.: + 420 296 809 281, Fax: +420 809 296 410, E-mail: sympo@imc.cas.cz

10–14 July 2005 • Polymer Gels • Prague, Czech Republic

68th Prague Meeting on Macromolecules and 44th Microsymposium on "Polymer Gels and Networks"

Prof. Michal Ilavský, Academy of the Sciences, Institute of Macromolecular Chemistry, Heyrovského nám. 2 CZ-162 06 Prague 6, Czech Republic, Tel.: +420 296 809 281, Fax: +420 809 296 410,

E-mail: ilavsky@kmf.troja.mff.cuni.cz

11–16 July 2005 • Organic Solids • Cargèse, Corsica, France

10th International ERPOS Conference—Electrical and Related Properties of Organic Solids and Polymers

Dr. Jean-Michel Nunzi, Laboratoire POMA, UMR-CNRS 6136, Université d'Angers, 2, Boulevard Lavoisier, F-49045 Angers cedex 01, France, Tel.: +33 0 2 4173 5364, Fax: +33 0 2 4173 5216,

E-mail: jean-michel.nunzi@univ-angers.fr

Mark Your Calendar

17–21 July 2005 • Organometallic Chemistry • Geneva, Switzerland

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

17–22 July 2005 • Carotenoids • Edinburgh, Scotland

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

31 July–5 August 2005 • Heterocyclic Chemistry • Palermo, Italy

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

7–12 August 2005 • Plasma Chemistry • Toronto, Ontario, Canada

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

13–21 August 2005 • IUPAC 43rd General Assembly • Beijing, China

IUPAC Secretariat, Tel.: +1 919 485 8700, Fax: +1 919 485 8706, E-mail: secretariat@iupac.org

14–19 August 2005 • IUPAC 40th Congress—Innovation in Chemistry • Beijing, China

Prof. Xibai Qiu, IUPAC-2005 Secretariat, c/o Chinese Chemical Society, PO Box 2709, Beijing 100080, China, Tel.: +86 (10) 62568157, Fax: +86 (10) 62568157, E-mail: qiuxb@iccas.ac.cn

14–18 August 2005 • Novel Aromatic Compounds • St. John's, Newfoundland, Canada

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

21–25 August 2005 • Solution Chemistry • Portoroz, Slovenia

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

30 August–3 September 2005 • Learning Science • Barcelona, Spain

European Science Education Research Association—"Contributions of Research to Enhancing Students' Interest in Learning Science"

Dr. Roser Pinto, CRECIM Centre de Recerca per a l'Educació Científica i Matemàtica, Campus de la UAB-Edifici G5, E-08193 Bellaterra, Barcelona, Spain, Tel.: +34 93 5813206, Fax: +34 93 5811169, E-mail: roser.pinto@uab.es

4–9 September 2005 • Analytical Spectroscopy • Antwerp, Belgium

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

5–9 September 2005 • Nanostructured Advanced Materials • Stellenbosch, South Africa

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

10–13 September 2005 • Macromolecule-Metal Complexes • Tirrenia (Pisa), Italy

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

11–15 September 2005 • Boron Chemistry • Sendai, Japan

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

Mark Your Calendar

12–18 September 2005 • Analytical Chemistry • Kiev, Ukraine

International Congress on Analytical Chemistry and Chemical Analysis (AC&CA-05)

Prof. Vladimir Zaitsev, Chemistry Department, Kiev National University, 60 Vladimirska, Kiev 01033, Ukraine, Tel.: +380 44-2393345, Fax: +380 44-2393345, E-mail: zaitsev@univ.kiev.ua

17–21 October 2005 • Radiochemistry • Beijing, China

Third Asia-Pacific Symposium on Radiochemistry (APSORC '05),

Prof. Z. F. Chai, Institute of High Energy Physics, Chinese Academy of Sciences, Yu Quan Rd. 19B, P.O. Box 918 Beijing 100039, China, Tel.: +86 10 8823 3191, Fax: +86 10 8823 3191, E-mail: zhaoyuliang@ihep.ac.cn or, apsorc2005@ihep.ac.cn

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10–13 January 2006 • Green Chemistry • Delhi, India

Second International Symposium on Green/Sustainable Chemistry

Dr. M. Kidwai, Department of Chemistry, University of Delhi, Delhi-110007, India, Fax: +91 11 27666235, E-mail: mkidwai@mantraonline.com

11–15 June 2006 • Organic Synthesis • Merida, Yucatan, Mexico

16th International Conference on Organic Synthesis (ICOS 16)

Dr. Eusebio Juaristi, Instituto Politecnico Nacional, Departamento de Quimica, Avenida IPN #2508, Esquina Ticoman, Mexico City, DF, 07360, Mexico, Tel: +52 55 50613722, Fax: +52 55 57477113, E-mail: juaristi@relaq.mx

6–11 August 2006 • Pesticide Chemistry • Kobe, Japan

11th International Congress of Pesticide Chemistry

Dr. Hisashi Miyagawa, Division Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan, Tel.: +81 75 753 6118, Fax: +81 75 753 6123, E-mail: miyagawa@kais.kyoto-u.ac.jp

Visas

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

How to Apply for IUPAC

Sponsorship

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

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

