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Bienvenidos a Puerto Rico

A Wrap Up of the 2011 IUPAC Congress and General Assembly

Sharing Reactions | Why Codes of Conduct Matter

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

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From the Editor

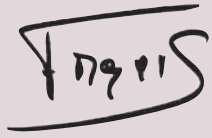
With the end of the year fast approaching, this editorial must be on IYC 2011 . . . for many of us, nothing in recent weeks and recent months has taken more time and energy. And soon, in just a few weeks, a Closing Ceremony will take place in Brussels, and from that point on, we will ask ourselves "What now?"

Thousands of volunteers worldwide have made IYC 2011 a tangible year-long celebration with thousands of activities and events. What if all this was to happen again in 2012? Perhaps IYC 2011 can be the spark, the impulse, or the excuse, to get out and establish a tradition of celebrating Chemistry as we never dared before. For many, IYC was the kick-off to organize science fairs, shows, exhibitions, animations, competitions—you name it—an activity that made Chemistry the star, the actor in the spot light. What a legacy it would be for IYC if all the volunteers who took part in celebrating Chemistry in 2011 were to plan to celebrate again in 2012 and regularly there after.

Before IYC 2011, there was no way to imagine how the year would shape up. But today, we have some ideas. A huge resource that has emerged and is now at our disposal is chemistry2011.org. Obviously, not all of the IYC is on the IYC website. IUPAC, which started it all with UNESCO by getting the UN to recognize IYC 2011, is committed to keeping the website as a resource available to all.

Chemistry2011.org was planned to publicize IYC 2011, to act as a clearinghouse for all activities happening under the umbrella of IYC, and encourage international participation. It has accomplished all of these goals. Take a casual browse, and you can see for yourself. As of 1 October, the site has recorded just over 8200 contacts from more than 160 countries, more than 2000 activities and events, and some 300 additional ideas. Since January 2011, the site has attracted an average of 1600 visits per day. Today, more than 50 percent of the site traffic is directed from search engines, 30 percent is from referring sites, and the difference from direct traffic, which is a good indicator that folks can easily find IYC.

To make the most of the website and to make it a legacy of IYC, we should all log in again, update the activities that are recorded and supplement that information with links to articles and reports that might have been posted here and there, and add pictures and comments. The IYC website is a gold mine of ideas and contacts, testimony that chemists worldwide are passionate about what they do. As a web 2.0 resource, it is up to us as part of the IYC network to enrich the site's content. So, let's not wait until the end of the year to tackle this task, log in now to chemistry2011.org.



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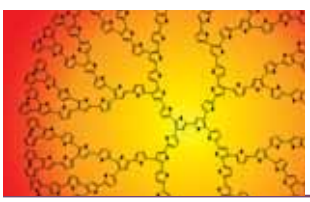


The 2nd Century of IUPAC—Challenges for Reforming and Planning

by Jung-Il Jin

It is true that happy memories tend to stay with us for long and sweeten our recollection of our historical paths. My case is not an exception. My occupancy of the IUPAC presidency and past presidency these past four years has given me the most unforgettable experiences in my life. This moment is a special one as it marks the end of my official, 20-year association with IUPAC. That said, IUPAC will continue to occupy a major part of my thoughts in the years to come as my concern for its future lingers on.

As we are all aware, this year, the International Year of Chemistry's worldwide activities have generated enough—if not to the degree of total satisfaction—enthusiasm and momentum for global chemistry communities to engage more with the public and the youth. The officers, Executive Committee, and Bureau of this Union, together with the IYC Management Committee have been discussing the importance of keeping this "momentum" alive into IUPAC's second century with the support of chemistry communities across the world.

During his Vice President's Critical Assessment speech at the last Council Meeting (3 August 2011, San Juan, Puerto Rico), the incoming president of IUPAC, Kazuyuki Tatsumi, highlighted among other things, "Reforming IUPAC." Now, we may ask ourselves why do we have to reform this Union and for whom? Is there anything wrong with it? There are many other questions and propositions. Kazuyuki Tatsumi also stressed on "Planning for the Future." These two aspects are very closely related. In order to make any reforms, we have to make a firm plan acceptable to the community, equipped with a successful implementation strategy.

It is my belief that the most fundamental question that we, IUPAC members and outsiders, would ask is what is the "identity" of IUPAC as perceived by the global community. There is no doubt that IUPAC enjoys the reputation of an internationally recognized authority in nomenclature of chemical compounds, terminology of chemical terms, and naming of new elements (i.e., development of chemical languages).

This is by far the most important function of IUPAC, which should be further fortified. This function has made immeasurable contributions not only to the progress of chemical science but also to global trade, manufacturing, and economics. Nobody will question the importance of this critical activity of IUPAC. At the same time, each of us tends to ask if we are satisfied with just that image, or if we would like to reflect the fact that IUPAC members are involved in a much wider range of activities. Even I am not sure what should be IUPAC's next important function. The expansion of the Union's positive image is becoming the focal point of member discussions, whenever we start to tackle reforming IUPAC. Needless to say, such an expanded image can be built only on IUPAC's strategy, which should define priorities in its activities or functions.

While a consensus on reform and planning for the future is reached, restructuring IUPAC, including the Secretariat, should be concurrently and critically reviewed. Financial implications for such changes should be analyzed, and a proper remedy which is implementable should be provided.

Before we take any action, the key issue we should try to answer is whether we want to see IUPAC take a leading role in innovative changes, both scientifically and socially, or maintain the present, conservative statue with minimal reorganization and redirection. The former requires major and rapid reform, while the latter means slower, gradual changes. I understand that there exist two major groups of thought in IUPAC bodies, and both parties have valid points. But what about the opinions of outsiders or non-IUPAC communities that desire to maintain steady communication with us, which we really should start to listen to seriously, before it is too late.

I wish all the best to the incoming president, Kazuyuki Tatsumi, and the new officers for their efforts in reforming and planning the future of IUPAC.

Last, but not least, I would like to take this opportunity to express my heartfelt gratitude to all the IUPAC members for their guidance, help, and cooperation during my presidency and past presidency. May God bless you!

Jung-Il Jin <jijin@korea.ac.kr> was IUPAC president in 2008–2009 and past president in 2010–2011. Previously in IUPAC, he served as president of the Polymer Division. Jin is a professor at the Korea University in Seoul, Korea.

Sharing Reactions

by Peter Atkins

As a contribution to the International Year of Chemistry, I decided to try to open the eyes of that elusive beast, the general public, to what lies at the core of chemistry: reactions. I decided to try to find a way to reveal the private life of atoms, what goes on at an atomic level, and what chemists hold in their mind's eyes when they carry out a chemical reaction. I wanted to lead the reader from a vague knowledge that chemists bring about change to the hurly-burly life of atoms that the change represents. As I write in the preface to my recent book *Reactions: The Private Life of Atoms*:

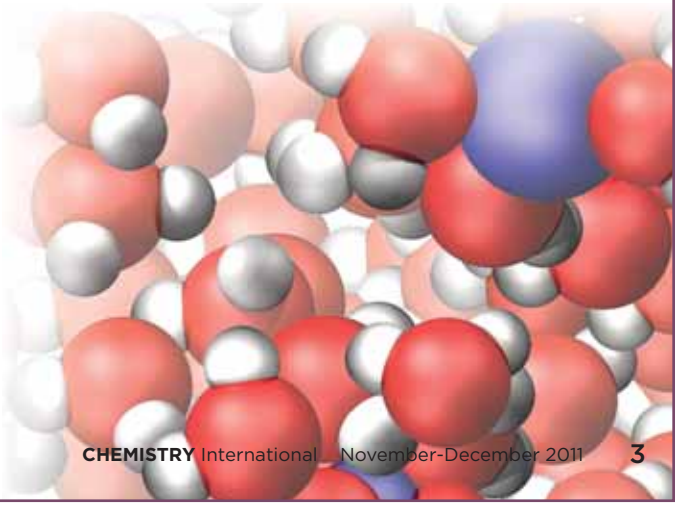
> . . . I have set out to help you understand and visualize the private lives of atoms so that when you look at chemical change—and chemical change is all around and within us, from the falling of a leaf through the digestion of food to the beating of a heart and even the forming of a thought, let alone the great industrial enterprises that manufacture the modern world—you will be able to imagine what is going on at a molecular scale. In the sections that follow, I invite you to imagine constructing a toolbox of fundamental processes which will enable you to imagine levering one atom away from its partner and encouraging it to join another. Then, with those basic tools in mind, I help you to establish a workshop where you will assemble the tools and bring them to bear on a variety of projects. Finally, I introduce you, in outline but not in detail, to how those workshops are invoked to engineer certain grand projects of construction.

All of us are aware that the representation of atoms and molecules is fraught with danger and that the representation of the changes they undergo is even more hazardous. Nevertheless, I consider it essential to use visual images to convey what many of us might have in our mind's eye when we think about chemistry, especially because images show that chemistry is all about tangible entities with characteristics that are the equivalent of personalities and which, like human personalities, lead them into a variety of combinations. The interplay of image and narrative was another challenge. I needed a relaxed, inviting tone, not that of an academic-textbook. I also wanted to achieve an effect in which the listening ear was able to glide with the watching eye into the images, so that the text was entwined with the illustrations, each reinforcing the role of the other.

I shall give some illustrations of the challenges and my solutions. So many of our reactions take place in the mobile world of water that I had to start there, and in particular with that simplest of all reactions, precipitation. After talking about water itself and the process of dissolving (of sodium chloride and silver nitrate, Fig 1), I write:

> As soon as the solutions mix and the ions can mingle, the strong electrical attraction between the oppositely charged Ag^+ and Cl^- ions draws them together into little localized solid clumps, a powder. To us molecule-sized observers, the tiny particles of powder are like great rocks smashing down around us, thundering down from the solution overhead. The weak interactions between the Na^+ ions and the smeared out charge of the NO_3^- ions are not strong enough to result in them clumping together: they remain in solution as a solution of soluble sodium nitrate. Precipitation reactions are about as simple as you can get in chemistry, the chemical equivalent of wife-swapping without the moral hesitation . . .

Figure 1: Silver nitrate solution.



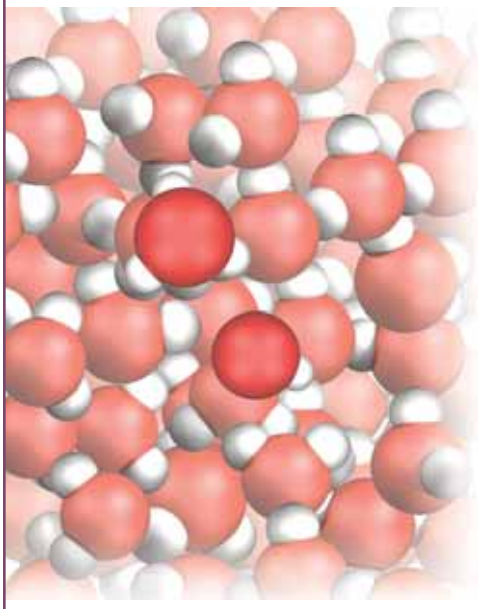


Figure 2: Water donating to itself.

A step up in importance and interest lie acid-base reactions, Fig. 2, and here I develop the concept of proton transfer and the gradual widening of the conceptual net from Arrhenius to Brønsted (and later to Lewis):

When definitions are enlarged, like changing from fishing in coastal water to deep ocean, peculiar species are sometimes caught. Before we go on to see that the new definition captures everything that Arrhenius would regard as an acid (and then more), there is a very important, completely unexpected fish brought up in Lowry and Brønsted's joint net. . . . Because two-faced water is not only an acid but also a base, then even before a conventional acid or base is added to a beaker of water, the molecules already present are both acids and bases. You now have to accept that when you drink a glass of water, you are drinking an acid. This is not a trivial conclusion to be shrugged off by saying that there somehow or other there probably isn't much acid present. *Every* molecule is an acid, so you are drinking pure, highly concentrated acid. If you don't like that thought, then you might like it even less to realize that you are also drinking a base. Once again, you can't shrug off the thought by saying that the water is probably just a very dilute solution of a base. *Every* molecule is a base, so with every sip or gulp you are drinking highly concentrated, pure base. Such are the consequences of expanding and generalizing definitions: designed to catch sardines, they turn out to capture sharks.

One challenge that presented itself as soon as I reached redox reactions was how to convey the migration of an electron, as in the discussion of corrosion. I decided to use a waving transparent purple river to convey the sense of migration, Fig. 3:

I shall now show you the reaction in more detail and try to lead you into appreciating visually what is going on inside a small droplet of water on the surface of a sheet of rusting iron. Although rusting is rarely thought beautiful, there is a beauty and subtlety in the choreography of atomic events that underlie its formation. As usual, you should imagine shrinking to the size of a molecule, plunging below the droplet's surface, and descending diver-like through the densely agitating, bustling, tumbling water molecules. You descend until you stand beside me on the hard surface of the virgin metal, among the rocky outcrops of iron atoms and the swirling eddies of water molecules.

From where we made metal-fall we strike out together towards the edge of the droplet, pushing through the water molecules. Near the edge we see oxygen molecules, O_2, splashing in from the air beyond and wriggling into the depths between the water molecules. Then we see violent electronic action. When a sharklike O_2 molecule reaches the iron surface it bites off two electrons from an Fe atom on an unwary outcrop. With two of its electrons gone, Fe has become Fe^{2+}. It begins to fall away from the outcrop and starts to be surrounded by a clustering shell of H_2O molecules . . .

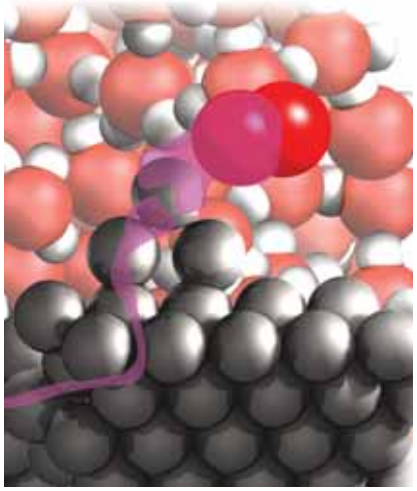
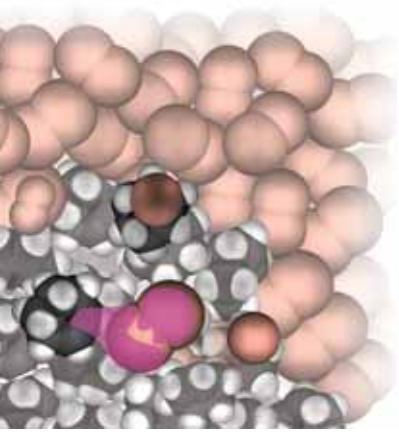


Figure 3: Reaction at the edge.

A perceptive reviewer of the original proposal worried that illustrations would all be dense collections of water molecules with the occasional glimpse of a reactant molecule. As it turned out, that was not the case, especially when I moved into the realm of organic reactions. Of course, there was another problem in this connection: which of the vast number of organic reactions should I choose? In the end I chose some typical addition and substitution reactions, Fig. 4. A further problem is that there is a lot going on during such reactions, and it is inevitable (I think) that the narrative gets more complicated:

Figure 4: Starting addition.



> Let's shrink together down to our normal molecular size and watch what happens as the bromine is poured into the cyclohexene. We already know that a bromine molecule has a nose for negative charge, so you should not be surprised to see one homing in on the electron-rich double bond of a nearby cyclohexene molecule. We see a lot of rearrangement of the electron cloud once the bromine molecule is in contact with the double bond. In particular, some of that bond's electron cloud bulges out from one C atom towards the exposed nucleus of the incoming molecule and starts to form a bond to it instead of to its original partner C atom. At the same time as that carbon-bromine bond starts to form, we see the original bromine-bromine bond starting to lengthen and weaken. At the end of this skirmish, a new carbon-bromine bond has formed, the old carbon-carbon double bond has dwindled to a single bond, the original bromine-bromine bond has broken, and the spare Br atom has drifted away as a Br^- ion. Gone it might be, but it has duty to do shortly . . .

Another "reactant" that needed thought is the photon. I needed to talk about photochemical processes, including photochemical smog and, more positively, vision and photosynthesis. I decided to depict a photon as a fuzzy yellow blob. At this stage in the presentation it was becoming impossible even to attempt to show in detail every step that was taking place in a complex biochemical process (the alternative was to write a whole other book). So, it became essential to focus on the core idea of what was taking place, Fig. 5:

> The impacting photon stirs up the electron cloud on a chlorophyll molecule, which briefly becomes the home of the arriving energy. That energy is like a hot potato. We see it quickly tossed to a neighboring chlorophyll molecule, and then to another. In a twinkling of an eye (in more conventional units, in about one ten-billionth of a second) the energy jumps between about a thousand molecules. By passing on rapidly from molecule to molecule, the energy avoids

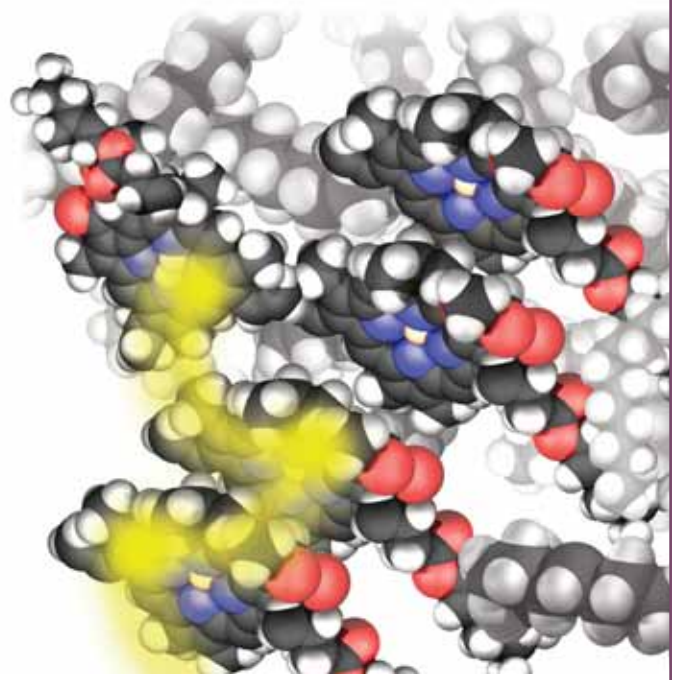


Figure 5: Energy dumping.

> degrading into molecular vibration (heat) or being emitted again as a photon, and is preserved for doing its job of synthesis. . . . The hot potato finally reaches the factory, the reaction center itself. It falls on to a pair of chlorophyll molecules and stirs up their electron clouds and then migrates to a closely related molecule, which is essentially a chlorophyll molecule without the central magnesium atom. The energy now is safely stored and can be used for construction by driving forward a string of proton transfer and redox reactions . . .

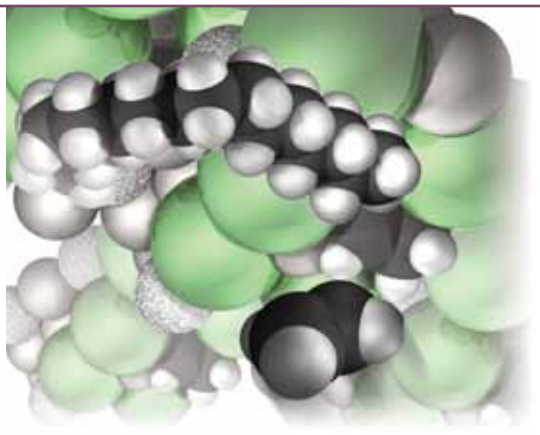


Figure 6: Polyethylene growing.

I thought it important to bring the varieties of reactions together to show how combinations of them play crucial roles in the modern world. For instance, I wanted to give impressions of varieties of polymerization reactions, including the mechanism of Ziegler–Natta catalysis. Here, the challenge was not only to describe a fairly complex sequence of events, but also to depict what is happening at the surface of the solid catalyst, Fig. 6:

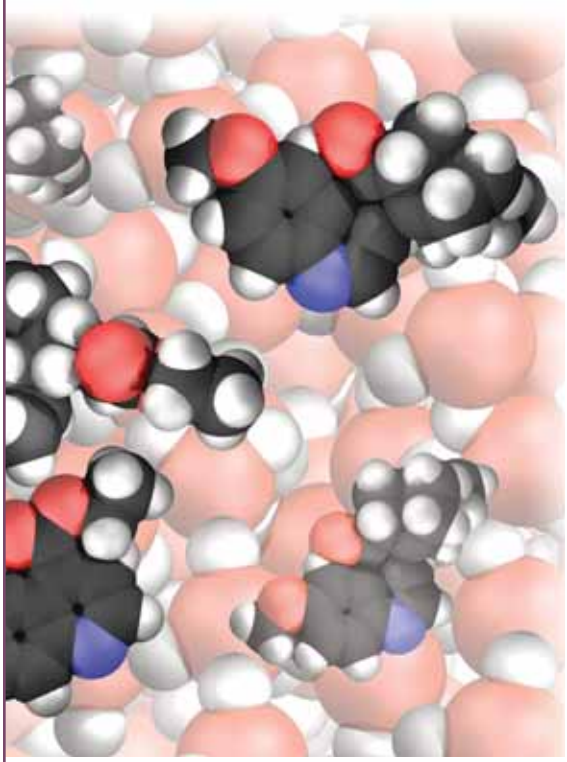


Figure 7: Joining the parts.

> A much more controlled version of the polymerization minimizes the hair [the side chains and cross-linking of polyethylene]. As a result, the molecules are much more like ordinary spaghetti, bald spaghetti, and can pack together much more efficiently, giving a denser material. The key is a catalyst discovered by a German chemist, Karl Ziegler, and an Italian chemist, Giulio Natta, in the 1950s; it earned them the Nobel Prize in 1963 . . .

More ambitiously, I wanted to give an impression—it could be no more than that—of how chemists deployed their awesome suite of tools to fabricate intricate architectural masterpieces, such as a quinine molecule, Fig. 7:

> . . . You have arrived at your extraordinary destination, quinine. You are, perhaps, a little chagrined to realize that *Cinchona Officinalis* brainlessy achieves the same result in the quiet contemplation of its cells without all the paraphernalia you have needed to use and using a much more sophisticated step under the influence of enzymes. But that's Nature. On the other hand, it is also quite remarkable that chemists have discovered how to emulate Her, and using the skills built up over a couple of hundred years to discover how to bend atoms to their will and build from them the equivalent of astonishing cathedrals.

***Reactions: The Private Life of Atoms*, by Peter Atkins, is published by Oxford University Press (2011).**

Why Codes of Conduct Matter

by Graham S. Pearson, Edwin D. Becker, and Leiv K. Sydnes*

Peter Atkins in his feature article "Where Would We Be without Chemistry?" in the March–April 2011 *CI* (p. 4) reminded us that chemistry, like any great enterprise, has a downside as well as an upside. It is used to make explosives for armaments, it creates poisons, and the effluents of chemistry plants can harm the environment. He went on to say that, with some exceptions, the chemical industry is well aware of its obligations to humanity and the environment and does what it can to avoid the potentially damaging effects of its activities. In the May-June *CI* (p. 8), Bernard West gave us "A Closer Look at Responsible Care: Is There a Broken Link?" As he explains, Responsible Care, adopted in 54 countries, is about building trust through ethical behavior, listening attentively to the evolving concerns of the public, and providing responses that clearly demonstrate the concerns have been heard. He goes on to say that although the application of Responsible Care has led to significant improvements in the performance of the industry, incidents continue to occur. There are still many improvements to be made even within the industries that already adhere to Responsible Care.

It is against this background that it is timely and important to examine why Codes of Conduct are relevant and matter for **all** those engaged in chemistry. The Codes of Conduct project arose from a workshop held in Oxford in June 2005 to address outreach, education, and the implementation of the Chemical Weapons Convention. Organized by IUPAC and the Organisation for the Prohibition of Chemical Weapons [*Pure and Applied Chemistry* 2006, **78**(11), 2169–2192], this workshop was particularly focused on the misuse of chemicals as weapons, but the discussions about codes of conduct from the outset had considered the broader view of how chemicals might be misused—whether as illicit drugs, to harm the environment, or to harm humans or animals. The discussions had focused on the responsibility of all who are engaged in chemistry to cause no harm, whether they are engaged in industry, academia, or government. Wherever chemists are engaged, they must consider the ethical implications of their work. And this question is especially relevant today in not only the traditional chemical communities but also in the biochemical and microbiological communities, where pathogenic organisms can easily be created.

In the fields of science and technology, work involving chemicals not only **needs** to be in compliance with international treaties, national laws, and regulations, but it needs to be **perceived** as being in compliance. Among the most important of the laws and treaties governing banned and severely restricted chemicals, prohibiting chemical or biological weapons, illicit drugs, and doping are the Chemical Weapons Convention, the Biological and Toxin Weapon Convention, the Conventions on Narcotic Drugs and Psychotropic Substances, the Rotterdam Convention on the Prior Informed Consent Procedure, the Stockholm Convention on Persistent Organic Pollutants, the Montreal Protocol, and the Basel Convention on Hazardous Wastes.

It is this consideration that makes codes of conduct so important. While international treaties are legally binding on the nations that have adhered to them, their national implementation depends on national laws and regulations. Recent surveys of academia around the world have shown that students are all too often unaware of the international treaties and the consequential obligations; it is here that codes provide an essential bridge between the national laws and regulations and those who are actually engaged

. . . codes provide an essential bridge between the national laws and regulations and those who are actually engaged in chemistry . . .

in chemistry in academia, industry, and government. Increased attention is being given to ethical principles and codes around the world, including initiatives such as those of the UNESCO Division of Ethics of Science and Technology. Some international unions—such as the International Union of Biochemistry and Molecular Biology in December 2005—have adopted their own codes of ethics. Furthermore, it has become evident that the new generation of chemists is keen to see ethical and other considerations taken into account. Guiding principles for a code of conduct would promote the service of chemistry to society and to global issues. Such a code would strengthen international chemistry and help to achieve high standards of excellence and relevance in academic, governmental, and industrial activities.

The IUPAC project* on Recommendations for Codes of Conduct started in October 2007. From the outset it was recognized that there are benefits to adopting a layered approach to codes. Thus, the project team decided that the code should have three layers: 1. universal principles, 2. society codes such as those developed by professional and industrial associations, and 3. codes developed by individual institutions/workplaces. These layers are complementary and mutually reinforcing. Furthermore, the team agreed that its approach would be to **extend** existing codes rather than create new one. However, the team recognized that if an organization or institution did not already have a code of conduct, then it should consider the benefits of adopting ones.

A progress report was presented at the 42nd IUPAC Congress held in Glasgow in August 2009 in the Ethics, Science, and Development (ChemRAWN XVIII) session. In addition, copies of the draft recommendations were distributed for comment to representatives of IUPAC's National Adhering Organizations during its 42nd Congress.

Global Management of Chemicals

Project team members were well aware of the widespread recognition globally of the importance of improving the management of chemicals. The International Conference on Chemicals Management met in Dubai in February 2006 to consider the Strategic Approach to International Chemicals Management and adopted two key points in its Dubai Declaration on International Chemicals Management. The first noted that the sound management of chemicals is essential if we are to achieve sustainable development. And the second recognized the need to take concerted action because of a wide range of chemical safety concerns at the international level. These have an important bearing on global issues such as the eradication of poverty and disease, the improvement of human health and the environment, and the elevation and maintenance of the standard of living in countries at all levels of development. In addition, these declarations help to address the lack of capacity for managing chemicals in developing countries and countries with economies in transition, dependency on pesticides in agriculture, exposure of workers to harmful chemicals, and concern about the long-term effects of chemicals on both human health and the environment.

In addition, we noted that toxic chemicals are attracting increased attention because of concerns about safety and the environment (e.g., in Europe the REACH regulation (**R**egistration, **E**valuation, **A**uthorisation and **R**estriction of **Ch**emical substances) is being put into effect while in the United States the Environmental Protection Agency is implementing the HPV (High Production Volume) program. Further requirements are also being introduced to counter concerns about chemical terrorism.

*The members of the IUPAC project 2007-022-2-020 were Graham S. Pearson (Chair), Sultan T. Abu-Orabi, Edwin D. Becker, Alastair W. Hay, Jo L Husbands, Peter G. Mahaffy, Robert Mathews, Ting-Kueh Soon, Leiv K.Sydnes, Natalia P. Tarasova, Bernard West and Maria C.E. van Dam-Mieras.

Towards Codes

As already mentioned, the chemical industry has long been concerned about the use of chemicals. Its Responsible Care program, developed in Canada in the early 1980s, is an ethically driven road map for taking every practical precaution to ensure that the chemical industry's processes and products do not present an unacceptable level of risk to its employees, customers, the public, or the environment. Responsible Care is about building trust through ethical behavior by demonstrating that the chemical industry is committed to *doing the right thing and be seen to doing the right thing*. Responsible Care is now an ICCA (International Council of Chemical Associations) global chemical initiative. The ICCA's focus is on developing global chemical industry positions and evolving programs on issues of international significance to the industry. These include areas such as health, safety, and the environment; international transport safety; intellectual property; trade policy; and industry efforts to eliminate chemical weapons and diversion of illegal drugs. ICCA also promotes and coordinates Responsible Care and other voluntary chemical industry initiatives. Although Responsible Care is initially voluntary, it generally becomes a mandatory requirement for membership.

The importance of codes has been clearly recognized by the states that are party to the international conventions relating to chemical and biological weapons. Thus, in 2005, the States Parties to the Biological and Toxin Weapons Convention agreed on the value of codes of conduct applying not just to scientists, but to **all those involved** in scientific activity, including managers and technical and ancillary staff [emphasis added]. They also agreed that it was important for such codes to be compatible with national legislation and regulatory controls. They need to be simple, clear, and easily understandable both to scientists and to wider civil society. They also have to be relevant, helpful, and effective for guiding relevant actors in making decisions and taking action in accordance with the purposes and objectives of the Convention, sufficiently broad in scope and regularly reviewed, evaluated for effectiveness, and revised as necessary. Three years later, in a report for the Second Review Conference of the Chemical Weapons Convention, the director general endorsed codes by saying that "the adoption of professional codes of conduct and other governance measures can help promote compliance with the requirements of the Convention by all professionals and institutions that deal with chemicals."

. . . codes need to be dynamic rather than static . . .

Guiding Principles for a Code

It is thus evident that considerations of guiding principles for codes of conduct need to reflect the breadth of concerns—relating to health, safety, security, and the environment. In order to have an impact on practice, codes need to be dynamic rather than static, and need to be incorporated into a continuing process akin to the considerations of health and safety that are considered prior to each new piece of work.

Guiding principles for a code of conduct would strengthen chemistry, both nationally and internationally, and help to achieve high standards of excellence and relevance in academic, governmental, and industrial activities. Such a code would also promote the service of chemistry to society and to global issues.

Guiding principles for a code would recognize the

extraordinary benefits to the quality of life, public health, and agriculture throughout the world made available by the knowledge, methods, and techniques involving chemicals. It would promote all aspects of chemistry, not just among members of the profession, but increasingly to the worldwide community. While chemistry is central to life and provides many valuable benefits for humankind, it can also raise important ethical issues. These issues can evolve as more development and uses of chemistry occur and guiding principles for a code of conduct would provide a framework within which to consider such issues.

It was against this backdrop that the IUPAC project sought to identify guiding principles that should be included in any code of conduct for those engaged in chemistry. We began by seeking examples of existing codes from a process of widespread consultation involving different cultural perspectives from around the world so as to ensure that the recommended principles are informed by the experience of other professional bodies that have codes, such as the International Council of Chemical Associations, which developed the Responsible Care Global Charter.

Recommended Principles

In developing our recommended principles, we started by putting their relevance in the context of IUPAC. Thus, we recognized that IUPAC provides leadership, facilitation, and encouragement of chemistry and promotes the norms, values, standards, and ethics of science and the free exchange of scientific information. In fulfilling this mission, IUPAC effectively contributes to the worldwide understanding and application of the chemical sciences, to the betterment of the human condition.

We then went on to develop an overarching objective that IUPAC recommend that all those engaged in chemistry review their existing codes of conduct, or develop new codes of conduct, to promote the safe use of chemicals in the public interest and in the furtherance of science, and to encourage compliance with all relevant international and national laws and regulations. All specific recommendations below should be taken in the context of this overarching objective.

We then recommended that IUPAC and all of its NAOs, Associate NAOs, and national chemical societies review their existing codes or develop new ones to encourage all those within their jurisdiction who engage in science and technology using chemicals to address the principles set out below.

Our first principle was that all those using chemicals should ensure that their own work is ethical and upholds the dignity, standing, reputation, and integrity of the profession. We then recognized that such users of chemicals should take steps to ensure that scientific knowledge and technologies are used only for the benefits and betterment of humankind and the environment.

We then recognized that those using chemicals should ensure that their work is in accordance with the principles of sustainable development and safeguards the earth's capacity to support life in all its diversity. And, furthermore, that chemicals, equipment, and facilities under their care and supervision are not used for illegal, harmful, or destructive purposes. In addition, any misuse of chemicals and facilities for criminal and/or destructive purposes should be reported to the relevant authority.

Next, we addressed the responsibility of chemists and other scientists to ensure the safety of and minimize risk to their fellow workers and colleagues, the general public, and the environment, bearing in mind both the intended and unintended consequences of their activities. They should also conduct regular health, safety, and security assessments of their work and facilities under their care.

We then turned to international and national obligations, pointing out the need to ensure that their work is, and is perceived to be, adherent to or compliant with national laws and international conventions on

chemicals and other related substances. And that those using chemicals should cooperate with governments and organizations to identify gaps in legislation, regulations, and standards, and to develop and implement new laws, regulations, and standards to meet these gaps.

Codes of Conduct Received from IUPAC Members

Royal Australian Chemical Institute Code of Ethics (See www.raci.org.au/theraci/corporate-governance/corporate-governance

Chemical Institute of Canada Codes of Ethics (See www.cheminst.ca/index.php?ci_id=1695&la_id=1#ethics

Chemistry Industry Association of Canada Responsible Care Codes of Practice (See www.canadianchemistry.ca/ ResponsibleCareHome/ ResponsibleCareBRCodesofPracticebr.aspx

Gesellschaft Deutscher Chemiker Code of Conduct (See www.gdch.de/gdch/satzung__e.htm)

Società Chimica Italiana Charter of Ethical Principles for the Chemical Sciences (See www.soc.chim.it/it/documenti/carta_dei_principi)

Chemical Society of Japan Environmental Charter '99 (See www.csj.jp/csj-en/activities/eco/env-c.html)

Korean Chemical Society Green Chemistry, Clean World (See http://eng.kcsnet.or.kr/ About KCS/Aims)

Chemical Society of Nigeria Green Chemistry and Sustainable Development: Challenges and Prospects (See http://02af665.netsolhost.com/News.html)

Colegio de Químicos de Puerto Rico Manual del Código de Ética

Royal Society of Chemistry Code of Conduct (See www.rsc.org/Membership/CodeofConduct.asp)

American Chemical Society The Chemical Professional's Code of Conduct (See www.acs.org/codeofconduct)

Finally, we urged those using chemicals to update their knowledge on the latest developments in the health and environmental risk of chemicals and related substances and to use their knowledge and understanding to facilitate public education, understanding, and appreciation of the benefits arising from chemistry as well as the risks associated with the misuse or inappropriate use of chemicals.

What You Should Do

We urge all readers—whether you belong to an NAO or ANAO or if you are someone who uses chemicals—to review whether you have a code of conduct or code of ethics. If you do, then review your code to consider whether it adequately and clearly embraces all the guiding principles set out here. If it does, then congratulate yourselves on being up to date, and continue to review your code at regular intervals. If it doesn't, then consider amending your code so as to embrace the points made here. And if you don't have a code at all, then give serious consideration to the benefits of adopting one—whether it addresses universal principles, or is a society code such as those developed by professional and industrial associations, or an institutional/workplace code such as those being developed by individual institutions/workplaces. If you do these things, you will have made a personal contribution to the International Year of Chemistry by promoting the worldwide understanding and application of the chemical sciences, to the betterment of the human condition.

Graham Pearson <Graham_Pearson@Compuserve.com> is a visiting professor in international security in the Division of Peace Studies at the University of Bradford, UK, where he has been engaged for over 15 years in promoting the strengthening of the international treaties totally prohibiting chemical and biological weapons. He was previously the director general of the Chemical and Biological Defense Establishment at Porton Down in the UK. He chaired IUPAC project 2007-022-2-020: Recommendations for Codes of Conduct.

2011
GA
San Juan, PR

Bienvenidos a Puerto Rico

One might think that after nearly a century of its flagship meetings, IUPAC's 42nd World Chemistry Congress and its 45th General Assembly would be little different than the previous gatherings. As it turned out, these IUPAC meetings, which took place in late July and early August 2011 in San Juan, Puerto Rico, were the first of their kind in many respects: the first to be held in a Latin American country, the first presided over by a woman president, and the first to be part of an International Year of Chemistry. The Congress itself was the first to feature seven Nobel laureates in chemistry, this was the first GA at which social media was a source of news and information, and this was the first GA at which Richard Hartshorn arrived *with* his luggage.

Front: IUPAC President Nicole Moreau with Young Prize Winner William Donald. Back: 2010 and 2011 Winners of the IUPAC Prize for Young Chemists.

Aside from the many "firsts" they offered, this IUPAC Congress and GA also felt different and not simply because of the island's pleasant tropical climate. The special energy, or "vibe," among attendees was likely due to the many activities and discussions involving the International Year of Chemistry. Among the most noteworthy IYC-related events were a day-long symposium devoted to women in chemistry, a huge chemistry festival held in Old San Juan, the World Chemistry Leadership Meeting, a special presentation of the Homo Sapiens Report by Michael Wadleigh, winner of the 1970 Academy Award for Best Documentary Feature for his documentary Woodstock, and an IYC booth for the Water globalXperiment held as part of the Congress Exhibit.

Aside from the excitement involving IYC 2011, the major news from the General Assembly was the election of Mark Cesa (USA) as vice president and the election of René Deplanque (Germany) as Secretary General. In addition, Javier García-Martínez (Spain) and Christopher Brett (Portugal) were elected to the IUPAC Bureau for the first time. Ram Lamba (Puerto Rico) and Natalia Tarasova (Russia) were both re-elected to the Bureau for their second four-year terms.

The General Assembly began 29 July with multiple meetings of the divisions and standing committees; the core business of the Union, and ended with the formal Council Meeting. At this GA, there were 517 registrants from 52 National Adhering Organizations, plus observers from Botswana, Peru, Colombia, and the Philippines.

President Nicole Moreau welcomed IUPAC members to the General Assembly and Congress at a well-attended and elaborate opening ceremony and reception. Eleven winners of the 2010 and 2011 IUPAC Prize for Young Chemists were presented during the Congress opening ceremony.

- Rubén Costa Riquelme, University of Valencia, Spain
- William Donald, University of California, Berkeley, California, USA
- Matthew Macauley, Simon Fraser University, Burnaby, British Columbia, Canada
- Bozhi Tian, Harvard University, Cambridge, Massachusetts, USA
- Sheng Xu, Georgia Institute of Technology, Atlanta, Georgia, USA




- Chengqi Yi, University of Chicago, Chicago, Illinois, USA

The winners of the 2010 IUPAC Prizes for Young Chemists are as follows:

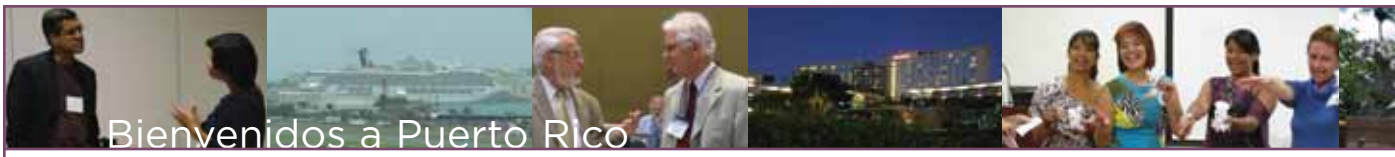
- Guangbin Dong, Stanford University, Palo Alto, California, USA
- Viktoria Gessner, Technical University Dortmund, Dortmund, Germany
- Rafal Klajn, Northwestern University, Evanston, Illinois, USA
- Jason Spruell, Northwestern University, Evanston, Illinois, USA
- Guihua Yu, Harvard University, Cambridge, Massachusetts, USA

The essays describing the winners' theses can be found on the IUPAC website. A review article of their research is published in the IUPAC journal *Pure and Applied Chemistry*. (The 2010 prizes are published in *PAC* 2010, issue 12; 2011 prizes are expected for later this year.)

In spite of the threat from a tropical storm off of the coast of Puerto Rico, the Council meeting took place as scheduled on 3 and 4 August. President Moreau welcomed the Council delegates and observers and finalized the agenda. Former IUPAC President Bryan Henry, representing ICSU, also delivered a welcoming address. Thereafter, Moreau delivered her President's State of the Union address, highlighting the fact that this was an especially busy year for IUPAC due to the concurrent International Year of Chemistry 2011. Her update of the IYC 2011 indicated that all cornerstone activities had been very successful to date. Next, Kazuyuki Tatsumi presented his Vice President's Critical Assessment. He stressed the importance of increasing IUPAC's global visibility and discussed growth objectives as the Union moves toward the 100th anniversary of its founding in 2019. David Black also delivered the Secretary General's report and expressed his thanks to the Council for its support during his eight-year tenure.

René Deplanque (left) and Mark Cesa congratulate eachother on their election wins. Deplanque (Germany) will be the next secretary general and Cesa (USA) will become the next vice president.

Three NAOs were formally welcomed to the IUPAC family by the vote of the Council Delegates. These were the Pancyprian Union of Chemists (Cyprus), the Tanzania Chemical Society (Tanzania), and the Chemical Society of Nigeria (Nigeria). With the addition of these three new members the total number of NAOs has increased to 58. In addition, the Indonesian Chemical Society (Indonesia) was approved by Council as an Associate National Adhering Organization (ANAO), bringing the total number of ANAOs to three. In addition, the Republic of Korea petitioned that its NAO Representative to IUPAC be changed from the Korean Federation of Science and Technology Societies to the

Korean Chemical Society. Brazil also petitioned that its NAO Representative be changed from the Brazilian Chemistry Committee for IUPAC to the Brazilian Chemical Society. Both petitions were approved unanimously by the Council.

Next on the Council docket were biennial reports of the divisions and standing committees, which were presented by the respective presidents and chairs and then opened for discussion and questions. (See the next *CI* for echoes from the committee meetings at the GA.)

On the financial side, Treasurer John Corish delivered the Biennial Report of the Treasurer and the Report of the Finance Committee. Overall, the finances of the Union are stable, even in light of the worldwide economic decline in the past few years. In his Interim Report on IYC 2011 he noted that the level of financial sponsorship generated from sources external to IUPAC has been quite high and perhaps somewhat better than was initially expected. The full financial impact of IYC 2011 will not be known in detail until the close of the year. Corish also presented the new Biennial Budget and National Subscriptions for 2012–2013. The Council approved both the new Budget and the National Subscription schedule as proposed.

IUPAC's retiring officers, division presidents, and standing committee chairs pose with IUPAC President Nicole Moreau who is holding Michael Wadleigh's Oscar with Secretary General David StC. Black, part of an elaborate joke during the Recognition of Service ceremony. (IUPACers can puzzle the caption and recognize that standing on the back raw, from left to right is DP4, DP6, DP1, DP3, DP5, CCEC, and sitting is PP, SG, P, and DP7).

Applications for two new Associated Organizations were approved by the Council: the European Chemistry Thematic Network Association and the Federation of Asian Polymer Societies.

The Turkish delegation reported on preparations for the 47th General Assembly and 44th World Chemistry Congress to be held in Istanbul in 2013. Preparations are well in hand for another successful biennial event. See <www.iupac2013.org> for updates. There was no update about the 2015 Congress which is to be held in Korea.

Colin Humphris addressed the Council with a summary of the World Chemistry Leadership Meeting (WCLM), which took place the day prior to the Council meeting. In this key activity of the IYC 2011, stakeholders gathered to debate the issues of sustainable development and how chemists led by IUPAC could make a positive impact by helping to solve the global problems of clean water, human health, agriculture and food production, and renewable energy supply through green chemistry. A highlight of the full-day event was a screening of the Future of Sustainable Chemistry <www.futurewecreate.com>, a video project and virtual conference hosted by The Dow Chemical Company, a major sponsor of the WCLM. A full recap of the WCLM will appear in the January issue.

Recognition of Service

There is no formal training that can prepare someone to become a good leader in an organization such as IUPAC. Division presidents and standing committee chairs can attest that their jobs are frequently challenging. One of Piet Steyn's priorities when he was IUPAC president (2002–2003) was to recognize the achievements of chemists and members of IUPAC. In 2003, he instituted a formal ceremony to honor and recognize the service of IUPAC's retiring officers, division presidents, and standing committee chairs. The tradition has continued since and at the conclusion of the President's Address on 30 July, IUPAC President Nicole Moreau presented plaques to the following members:

- Jim McQuillan retiring as president of the Physical and Biophysical Chemistry Division (DP1)
- Gerrit Koomen retiring as president of the Organic and Biomolecular Chemistry Division (DP3)
- Chris Ober retiring as president of the Polymer Division (DP4)

- Ales Fajgelj retiring as president of the Analytical Chemistry Division (DP5)
- Nicola Senesi retiring as president of the Chemistry and the Environment Division (DP6)
- Doug Templeton retiring as president of the Chemistry and Human Health Division (DP7)
- Peter Mahaffy retiring as chair of the Committee on Chemistry Education (CCEC)
- David Black retiring as Secretary General (SG)
- Jung-Il Jin retiring as vice president, president, and past president (PP)

Kazuyuki Tatsumi (Japan) presenting his Vice President's Critical Assessment.

Young Observers

"Any scientific discipline, if it plans to remain vibrant and innovative, must explore ways to renew itself as it expands into new areas and develops new techniques." These were the words of former IUPAC Bureau member E.P. Przybylowicz and he was referring to the Young Observers (YOs) program.

For nearly 15 years, Young Observers have participated in session of the General Assembly. These chemists, who represent a broad array of expertise and professional backgrounds, add vitality and a valuable perspective to the committee work in which they participate. This year, the IUPAC GA welcomed 19 YOs from 9 countries: China, India, Ireland, Japan, Peru, Philippines, Turkey, UK, and the USA.

The YOs briefing session on 28 July, in which some officers and members participated, provided an infor-

From Swaziland to San Juan

One of the Young Observers at the GA shared a fascinating story about the role that IUPAC played in his decision to pursue a Ph.D. in chemistry. After obtaining a B.S. in chemistry as an undergrad, Justin Youngblood found himself unsure what to do with his degree. So, as many have done before, he joined the Peace Corps and found himself in Swaziland, the small country between South Africa and Mozambique.

At one point in 1996, Youngblood traveled by bus to Windhoek, Namibia, for a week-long break. The trip involved a long stopover in Johannesburg where he would catch a bus to take him across South Africa's Transvaal region (great plains). With the University of the Witwatersrand a short walk from the bus rank in downtown Johannesburg, Youngblood said that "curiosity got the better of me." Upon exploring the chemistry department, he came across a flyer for an IUPAC conference on chemistry and the environment that grabbed his attention.

A few months later, Youngblood returned to the campus to attend the conference and it proved to be a life-changing moment. The lectures were so fascinating that he decided then and there that he would eventually pursue a Ph.D. in chemistry. Further, he made a commitment to use chemistry to help the environment. Today, as a professor of chemistry at the University of North Texas, his research focuses on using synthetic organic chemistry to design compounds for studying and improving electron transport behavior in solar cells. And, all these years later, having come full circle in a sense, Prof. Youngblood confided that he still has a memento from that conference in Durban: the original flyer that reignited his passion for chemistry.

"IUPAC has been a great inspiration in my life and career," Youngblood said. "I hope in the future to give back in a way that helps IUPAC to inspire another generation of scientists to work on scientific topics that can benefit Earth and humanity."

W. Justin Youngblood (University of North Texas, Denton, TX, USA) is seated to the right. Fellow Young Observer Leif Abrell (University of Arizona, Tuscon, AZ, USA) is on the left, and former YO Daniel Rabinovich, University of North Carolina (USA), is in the back.

mal introduction to IUPAC and gave YOs an idea of what to expect during committee meetings. The 2011 YOs are listed at http://2011ga.wordpress.com.

In fact, the 2011 YOs were the first, and perhaps the most active, participants in a social networking experiment that was conducted during the GA. Despite a lot of discussion about harnessing social networking tools, IUPAC had not yet ventured into this territory. Nevertheless, the *CI* team of editors undertook an experiment to develop and maintain a presence on Facebook, Twitter, and a blog during the GA.

Join the Experiment!

2011 GA San Juan, PR

stay informed • connect • share

facebook tinyurl.com/iupac2011ga

WordPress Blog . . . 2011ga.wordpress.com

twitter . . . . . #2011GenAssembly

These social tools were designed to provide news and resources for those attending the GA and to replace the former printed GA newsletter, *GAllium*, which served three consecutive GAs starting in Beijing in 2005. It was hoped that this medium of communication would be more spontaneous and more inviting as everyone could make posts, add comments, share links, upload photos, and be part of the discussion. Finally for those unable to join the GA, it was a way for them to get the vibe of what was going on. Now that the GA is over, it is still a valuable reference.

As the GA took place and the experiment got underway, it was rewarding to be able to post news and updates in real time and have people react. The *CI* team was pleased with the numbers, which gradually grew: by the end of the GA, the raw numbers for Facebook were around 7500 post views, 60 likes, and 195 active users. As Linus Pauling said: "The way to get good ideas is to get lots of ideas, and throw the bad ones away" . . . with that in mind, the *CI* team is now planning to develop a social network experience for *CI*.

Learning with Laughter

On 29 July 2011, 20 high school and middle school science teachers who might otherwise be enjoying their summer breaks, gathered for a workshop to learn how to implement the Young Ambassadors for Chemistry program in their classrooms. Since 2004, the Young Ambassadors for Chemistry has been an important project of the IUPAC Committee on Chemistry Education, with the ultimate goal of increasing public interest in chemistry (see IUPAC project 2007-005-2-050 for more details). Held at the Chemistry Department of the University of Puerto Rico–Rio Piedras in San Juan, the workshop found a highly receptive and enthusiastic audience. The teachers were guided through the workshop by Lida Schoen and Erica Steenberg, Science Across the World team members, who used a "train the teachers" approach in which the teachers perform the same experiments and exercises that they will have their students perform. Workshop participants were assisted by a friendly group of graduate students of Prof. Ingrid Montes of the Department of Chemistry.

Ingrid Montes (left) and Lida Schoen.

As the photos below attest, the teachers at the workshop shared many laughs as they created and performed skits of television commercials for the creams and lotions they created in the earlier experiments.

www.chemistry2011.org/participate/ideas/show?id=6

IUPAC 2011 World Congress

by Gabriel A. Infante

Gabriel Infante, president of the IUPAC 2011 World Congress Organizing Committee.

The IUPAC Congress that took place 31 July to 7 August 2011 in San Juan, Puerto Rico was one of the major cornerstone events celebrating IYC. Hosted by the Colegio de Químicos de Puerto Rico, the Congress was a unique and exciting forum for meeting the challenge put forth by the event's theme: "Chemistry Bridging Innovation among the Americas and the World." With around 2800 attendees, 1274 scientific papers, 7 Nobel laureates, and many special events, the Congress was the largest scientific meeting ever held in Puerto Rico.

The Congress included plenary speakers, symposia, oral and poster presentations, workshops, seminars, group meetings, and state-of-the-art scientific exhibitions. For the first time, the Congress featured seven Nobel laureates in chemistry as plenary speakers.

- Aaron Ciechanover (2004), Israel
- Richard R. Ernst (1991), Switzerland
- Ada Yonath (2009), Israel
- Roald Hoffmann (1981), USA
- Mario J. Molina (1995), USA (University of California at San Diego and the only Latin American with a Nobel in Chemistry)
- Richard Schrock (2005), USA
- Robert Grubbs (2005), USA

The scientific program, besides the seven plenary sessions featured:

- three additional invited speakers (Ira Reese, USA, Peter Atkins, UK , and Luis Echegoyen, USA)
- 35 symposia in 93 concurrent sessions
- 55 general oral concurrent sessions
- 22 poster sessions
- 22 continuing education courses

The scientific papers were organized in the following areas:

- Alternative Energy Sources
- Chemistry and the Environment
- Chemistry of Life
- Chemical Education and Heritage
- Industrial and Applied Chemistry
- Materials Science
- Macromolecular, Supramolecular and Nanotechnology
- Chemical Synthesis
- Chemical Analysis and Imaging
- Theoretical, Physical and Computational Chemistry

The Congress offered a number of special activities and events that celebrated the International Year of Chemistry.

- A day-long symposium organized by Ingrid Montes featured internationally prominent chemists speaking on the topic "Are Women Still Underrepresented in Science?" A corresponding award ceremony and exhibit honored 23 Distinguished Women in Chemistry/Chemical Engineering.
- The Festival de Quimica, which was held 31 July and stretched the length of Paseo de la Princesa in Old San Juan, enabled members of the public to participate in chemistry activities run by enthusiastic, young members of local ACS chapters.

Flor R. Mattos de Jesús, President CQPR, welcomes attendees at the Congress Opening Ceremony.

- Science on Wheels sponsored by UPR, Mayagüez Campus, and organized by Juan Lopez Garriga and Carlos Ruiz.
- A special lecture, the "Homo Sapiens Report: The Future of Humanity," by Oscar-winning director Michael Wadleigh.

The exhibition hall, one of the largest ever at an IUPAC Congress, featured four islands (Waters, Agilent, Thermo, and Pridco-Puerto Rico Tourism Co.) and 82 other booths from different companies, agencies, and universities.

Another unique activity for an IUPAC Congress was the Special Session of the Puerto Rican Senate that took place in the Capitol on 4 August to recognize the visiting Nobel Laureates, the IUPAC Officers, and the IUPAC 2011 Local Organizing Committee.

Some memorable social activities gave attendees a taste of Puerto Rican culture. The Puerto Rican Night, sponsored and organized by Puerto Rico Tourism Co. included typical local music and food. The highlight of the Opening Ceremony was the Bayamón Symphony Orchestra directed by Prof. Angel Mattos.

This Congress had a record number of latinamerican participants with 262 or 26.7 percent: Colombia 86, Mexico 46, Brazil and Perú 32 each, and 25 Dominican Republic. The largest delegation was from the USA with 293 or 30 percent.

IUPAC 2011 was made possible by the financial support and collaboration of the Puerto Rico Legislature, The American Chemical Society, PR Tourism CO., PR Convention Bureau, PRIDCO. The island universities: UMET and Turabo (Ana G. Méndez University System) Caribbean University, Interamerican University, Pontifical Catholic University of Puerto Rico, UPR-Mayagüez and Rio Piedras Campuses, Puerto Rico Science, Technology and Research Trust. In addition, a number of private companies, including Pfizer, Amgen, Eli-Lilly, Waters, Agilent, and others made important contributions to the Congress.

Roald Hoffmann (left) reads one of his poems before beginning his lecture at the symposium on Chemistry and Culture. Peter Atkins (right) discusses "The Limitless Power of Science."

www.iupac2011.org
www.chemistry2011.org/participate/activities/show?id=2

The Homo Sapiens Report

One of the more compelling events at the 2011 IUPAC Congress was a special presentation of the Homo Sapiens Report: The Future of Humanity on 31 July. This highly visual lecture by Oscar-winning film director Michael Wadleigh takes a broad look at the complex issues mankind will be facing over the next century.

Michael Wadleigh is an Oscar winning film director and co-founder of The Homo Sapiens Foundation, which is part of an official project of UNESCO's education for sustainable development.

Before his lecture, *Chemistry International* Managing Editor Fabienne Meyers had the chance to sit down with Wadleigh and talk about why he was interested in speaking at the IUPAC Congress.

"Ever single millenium goal is failing," said Wadleigh. "Political and business systems aren't able to solve the problems facing humanity. Therefore, science has to play a leading role." The question he wants IUPAC members to consider, he said, is "What should science academies and societies do?" According to Wadleigh, one of the most important things scientists could do is to become a stronger voice in the decisionmaking process.

www.chemistry2011.org/participate/activities/show?id=1420

Are Women Still Underrepresented in Science?

by Ingrid Montes and Janet Bryant

The project "Are women still under-represented in science?" was initiated to support one of the main objectives of IYC 2011: the celebration of the 100th anniversary of the Nobel Prize in Chemistry awarded to Mme Curie. Generously supported by the American Chemical Society (ACS) as one of its IYC 2011 Challenge Grants the goals of the project were as follows:

1. host a day-long symposium at the IUPAC World Chemistry Congress featuring internationally-prominent chemists speaking to the topic, "Are women still underrepresented in science?"
2. recognize the recipients of the "Distinguished Women in Chemistry/Chemical Engineering" award to acknowledge and promote the work of women chemists/chemical engineers worldwide
3. host a public performance of a play about Marie Curie at the Congress
4. publish web-based interviews with the Distinguished Chemists/Chemical Engineers

To achieve the first goal, a full day symposium "Are Women Still Underrepresented in Science?" was held on 2 August 2011 as part of the scientific program of the Congress. The symposium was well attended with approximately 200 attendees in the morning session and 100 during the afternoon.

The first speaker for the day was Nancy B. Jackson, president of the American Chemical Society 2011, whose talk was entitled "U.S. Women in the Chemical Enterprise—Trends, Issues, and Interventions." Currently, the percentage of women receiving Bachelor's degrees in chemistry is at parity with their representation in the general population. However, the statistics for graduate enrollment, graduate degrees awarded, and employment show a different trend; due to inadequate retention, women are still underrepresented in chemistry in the USA. She also provided a historical look at the progress of women in the chemical enterprise in the USA, explored persistent issues and possible causes for their underrepresentation, and highlighted effective interventions.

A special touch to this symposium was the participation of Her Royal Highness Princess Chulabhorn Mahidol of Thailand as one of the speakers. Her talk on "Journey of a Female Thai Chemist" emphasized that all available data show that in almost all women are still underrepresented in science. This has been the case throughout history and, although this situation may be changing, the change is slow. Examples of successful women scientists are rare due to lack of opportunity and encouragement rather than lack of ability and dedication. In the USA, less than 12 percent of women work in science, technology, engineering, or math. Princess Mahidol stated that she firmly believes that a strong role model is one of the keys to breaking the traditional and still current educational, social, and career factors that fail to encourage women to develop the interest and will to succeed in science, even when they clearly demonstrate the ability to do so. Her chemical research at Chulabhorn Research Institute are conducted in the Laboratory of Natural Products, Laboratory of Medicinal Chemistry, and Laboratory of Organic Synthesis. Apart from research, she also oversees international programs (e.g., the Asian Core Program: Cutting Edge in Organic Chemistry, which involves eight Asian countries, and the Thailand Research Experience for Undergraduates sponsored by the National Science Foundation).

Lined up to shake hands with Princess Chulabhorn Mahidol of Thailand are Ingrid Montes (far right), Supawan Tantayanon (IUPAC Representative from Thailand), Bassam Shakhashiri (ACS President elect), and Nancy Jackson (ACS President).

Another speaker was Izabela Nowak from Poland, whose talk "Gender Issues in Poland: Facing the 21st Century Science" affirmed that although women have made gains, stereotypes and cultural biases still impede their success in science, technology, engineering, and math. In particular, she pointed out, the share of Polish women among researchers (25 percent) in the business sector is very low among European Union countries. In Poland, the gap between men and women in engineering and technology R&D is higher than the EU average. The gender imbalance between men and women in decision-making positions is also striking she said. On average, only 32 percent of managers in Polish enterprises are women. By contrast, in the government and higher-education sectors, approximately one researcher in two (43 percent in 2009) is a woman; however, only 22 percent of professors are female. Additionally, among 193 actual members of the Polish Academy of Sciences in 2010 there were only 6 women. Women are the heads of only seven of 76 research institutes. Last, but not least, Nowak stated that the percentage of women graduates in science and technology in Poland is above the EU average. In the past 30 years, the number of men and women receiving a doctoral degree has equaled (in 2007, 49 percent of those obtaining a doctoral degree were women). However, still far fewer women than men obtain post-doctoral degrees (32 percent).

Participants in the symposium "Are Women Still Under-Represented in Science?"

To close the morning session, Vanderlan Bolzani from Brazil presented her talk entitled "Woman in the Development of Brazilian Chemistry Science, and Its Contribution for the Advances on Natural Products." She indicated that since the dawn of civilization, women all over the world have participated in the unraveling of the secrets of nature and contributed to science in several important discoveries, despite many barriers. The history of science in Brazil is relatively recent when compared to other countries, but their scientific community has been growing steadily in the last 50 years. According to recent statistics from the last National Research Council, of all researchers registered in Brazil, 22 797 are women, which represents 49 percent of the total.

According to Bolzania, there has been a substantial increase in the participation of women researchers in Brazil in strategic fields such as bioenergy, medicinal chemistry, environment, materials, and natural products. However, she said, there has not been a corresponding increase in the percentage of women leading research teams (only 28 percent are research leaders).

Nicole Moreau, president of IUPAC, started the afternoon session with her talk "Women in Science and in Chemistry, with Emphasis on Europe and France." She noted that in the so-called "grandes ecoles" in chemistry in France, there are as many, if not more, girls as boys. So, she asked, is it true that after their studies they disappear from the chemistry scene? And if it is true, how can we explain this situation? She discussed possible explanations, including the obstacles girls will/could encounter when pursuing scientific careers, and how much of the problem is due to themselves, and who or what keeps them from being successful. Moreau also discussed the way women in the academic world respond to various situations as compared to their male colleagues. She also compared women's careers in science with other domains, such as politics and management.

Natalia Tarasova, from Russia, presented a talk on "Women's Careers in Chemistry: Education, Science, and Business. The Russian Example." She indicated that the goals of sustainable development require the elaboration of the strategies that can guarantee real gender equality for women on the local national, regional, and global scale. According to Russian sociological surveys, existing gender stereotypes are the main obstacle for career development of women. Tarasova then gave an overview of women in chemistry today: 40 percent of female graduates leave chemistry, 20 percent continue their career in areas that are related to chemistry, and only 30 percent are directly involved in chemistry or chemical technology. In 2010, women accounted for 49 percent of chemistry students, 47 percent of Ph.D. students, and 33 percent of doctorate students (the highest academic degree in the Russian system). Meanwhile, in the Russian Academy of Sciences' Branch of Chemistry and Material Science, fewer than 2 percent are women.

Bienvenidos a Puerto Rico

"Women in the Chemical Industry," the talk by Carolyn Ribes of The Netherlands, described the business case for diversity: data show that companies with women on their senior leadership teams have better financial results, including return on equity and higher stock prices. She estimated that 10 percent of members of the Board of Directors at the largest global chemical companies are women. Women have a strong presence at entry levels but do not move into middle and senior positions at the same rate as men. The competing demands of work and home affect career decisions, especially for mid-career women. As a result, women may choose to make horizontal career moves into positions that are more family friendly with fewer demands that they be available "anytime/anywhere." Ribes noted that many companies have implemented policies and programs to simplify work/life balance and to drive diversity and inclusion.

Ayse Zehra Aroguz of Turkey, in her talk "The Profile of Women in Science and Chemistry in Turkey," described how women's struggle for equality in Turkey has led to the situation today in which there are more women scientists in chemistry than men.

The symposium wrapped up with an anthropologist and a vice president of UNESCO's Committee on the Ethics of Science, Hebe Vessuri from Venezuela, who presented her talk "Opportunity and Temperament. From Context to Realization in the Gender Domain." Vessuri discussed the demographics of women scientists in Venezuela and then looked at several case studies of women scientists from Venezuela as narrated by them. Vessuri also explained why and how those women became interested in science and what might follow from their particular experiences. Adopting a sociological understanding of the way that values are interpreted she gave an analytically consistent account of the case studies and showed the rich variation in the interplay between temperament and opportunity.

The symposium was followed by a public event at the Congress: a reenactment of parts of Marie Curie's life by professional actress Susan M. Frontczak. The play was open to the public and was very well attended by participants of the Congress.

Another goal of this project was to acknowledge and promote the work of women chemists/chemical engineers worldwide by recognizing them with a special award. On 2 August, the following 23 women were recognized as "Distinguished Women in Chemistry/Chemical Engineering" in a formal ceremony:

- Nouria A. Al-Awadi, Kuwait
- Faizah Mohammed Abdel Mohsin Al-Kharafi, Kuwait
- Ayse Aroguz, Turkey
- Vanderlan Bolzani, Brazil
- Novella Bridges, USA
- Luisa De Cola-Germany, Germany
- Joanna Fowler, USA
- Véronique Gouverneur, UK
- Magdolna Hargittai, Hungary
- Nancy B. Jackson, USA
- Susan M. Kauzlarich, USA
- Katharina Kohse-Höinghaus, Germany
- H.R.H. Princess Chulabhorn Mahidol, Thailand
- Nicole J. Moreau, France
- Linda F. Nazar, Canada
- Izabela Nowak, Poland
- Carolyn Ribes, Netherlands
- Sara Snogerup Linse, Sweden
- Yoshie Souma, Japan
- Natalia Tarasova, Russia
- Klára Tóth, Hungary
- Lesley J. Yellowlees, UK
- Ada E. Yonath, Israel

From left: Nancy Jackson (ACS President), Ada Yonath (Nobel laureate 2009), and Janet Bryant.

A brochure about the 23 women who were honored was included in the registration package for Congress participants. In addition, posters about each woman were exhibited in a public area during the Congress. The Embassy of Poland joined the tribute to women in chemistry by sending its special exhibition of Marie Curie designed for the International year of Chemistry.

The award presentation was followed by a reception in honor of the recipients, hosted by IYC 2011 Partner Dow Chemical Latin America.

The project was led by Principal Investigator Ingrid Montes of the University of Puerto Rico at Rio Piedras and co-organizer Janet Bryant of the U.S. Department of Energy's Pacific Northwest National Laboratory.

www.iupac2011.org/D_women.html
www.chemistry2011.org/participate/activities/show?id=1156

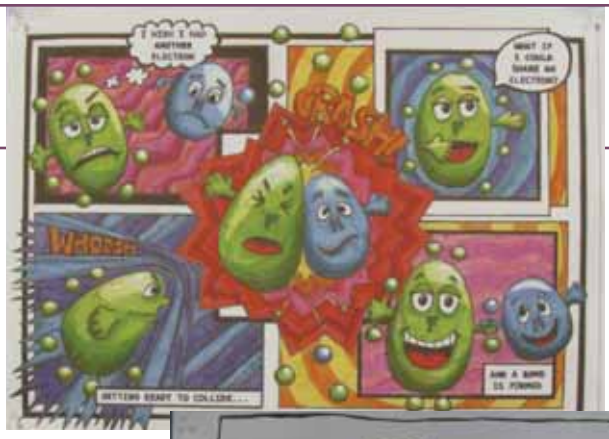
Chemistry Cartoons

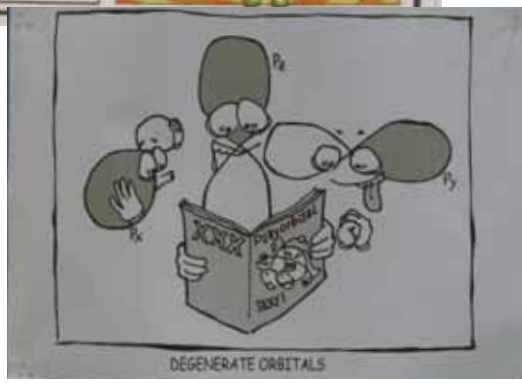
Cartoons about chemistry were the focus of an IYC 2011 competition carried out by IUPAC's Physical and Biophysical Chemistry Division. On 1 August, Jessica Hough of Valley Central High School, Montgomery, New York, USA, was awarded first prize in the Chemistry Cartoon Competition at a ceremony held in the Exhibition Hall of the IUPAC Congress in San Juan.

Hough's cartoon, entitled *Chemical Attraction*, was selected from 63 entries from 8 countries. The goal of the competition was to clearly illustrate a chemistry principle in a way that would be clear and accessible to the general public and would enrich the teaching of chemistry. The entries were judged based on three criteria: the science, their appearance and the sense of humor in the cartoon. The cartoons were judged by the following panel of chemistry professors involved with IUPAC: Assaf Friedler (Israel), Maria Filomena Camoes (Portugal), Richard Hartshorn, (New Zealand), Sanjay Mathur (Germany), and Doug Templeton (Canada).

Merit prizes were awarded to the following students:

- Caroline Dahl, a postgraduate at the University of Oxford, UK
- Bruno Demoro, a postgraduate at Universidad de la República, Uruguay
- Phoebe Low, of West High School, Iowa City, Iowa, USA
- Megan Jackson, an undergraduate at California Institute of Technology, USA
- Elizabeth Randall, an undergraduate at the University of Birmingham, UK





Top: Merit prize winner "Crash Bond" by Elizabeth Randall. Bottom: Merit prize winner "Degenerate Orbitals" by Bruno Demoro.

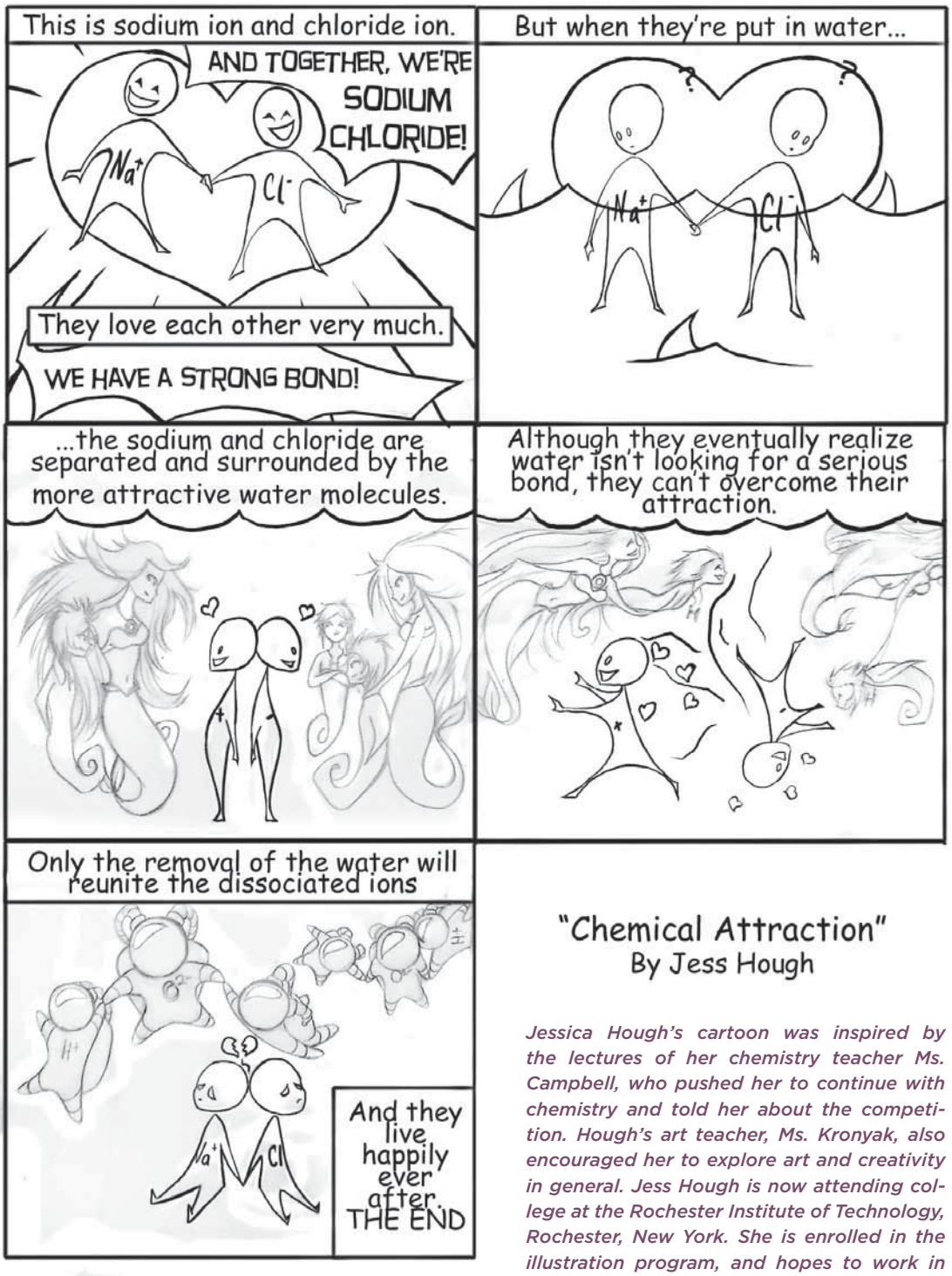
Travel support for Jessica to attend the IUPAC Congress was provided by Corning Incorporated, Mid-Hudson Local Section of the American Chemical Society, and the American Chemical Society. The IUPAC Physical and Biophysical Division also acknowledges the coordinating support of Kathe Hughes of the U.S. National Academy of Science, representing the USA IUPAC National Adhering Organization.

As an outcome of this initiative, the division now plans to run an annual student physical chemistry cartoon competition.

www.chemistry2011.org/participate/activities/show?id=361

Jim McQuillan presenting Hough with her award on 1 August during the IUPAC Congress in San Juan.

Jessica Hough poses with an international melting pot of members of the IUPAC Physical and Biophysical Chemistry Division: (from L) Brian Sykes (Canada), Rolando Guidelli (Italy), Roberto Marquadt (France, Div Secretary), Jim McQuillan (New Zealand, Div President), Jessica, Angela Wilson (USA), and Kaoru Yamanouchi (Japan, Div VP).



"Chemical Attraction"
By Jess Hough

Jessica Hough's cartoon was inspired by the lectures of her chemistry teacher Ms. Campbell, who pushed her to continue with chemistry and told her about the competition. Hough's art teacher, Ms. Kronyak, also encouraged her to explore art and creativity in general. Jess Hough is now attending college at the Rochester Institute of Technology, Rochester, New York. She is enrolled in the illustration program, and hopes to work in enough chemistry electives to put together a concentration or possibly a minor. Scientific art is a definite interest.

A World without Polymers

"Chuck was woken up by a ray of sunlight, but something was different from the previous day: his alarm clock had not rung yet and he was in a cotton hammock, which seemed strange because he was sure that the day before he had fallen asleep in a bed. But it wasn't the only thing changed; his computer had disappeared and he had a candle instead of his lamp. He got up and went to his bathroom but instead of the bathroom there was a door overlooking the river with a waterfall. He was completely shocked! His neighbors were having a shower so he decided to look for his soap because his plastic shampoo bottle had disappeared. After this refreshing shower, he looked for his clothes but found only buffalo skin. He wondered if he had gone mad or if everything had really changed. He wore the buffalo skin and went to his kitchen. Once more, everything had changed: no more refrigerator to keep his food cool; his chairs and table were made of wood, his pan of clay, his plates, knifes, spoon, and forks of ceramic. He was completely bewildered! After finding his cereal in a wooden box, he returned to brush his teeth with a toothbrush made of bone and hair."

Chuck's story, narrated by Marylou Dauch, Bérengère Escuyer, Angélique Lebon, and Magali Reynard from the Lycée Pierre-Gilles de Gennes in Paris, France, is one of the award-winning essays of the IUPAC Polymer Division's IYC Contest. The contest, titled "A World Without Polymers," was organized by Giancarlo Galli (University of Pisa, Italy) and Majda Zigon (National Institute of Chemistry, Ljubljana, Slovenia).

The video/essay contest was open to university and high-school students in each of IUPAC's 60 member countries. Students were asked to submit either a video or an essay on the theme of "A World Without Polymers?", that is, to consider how the world might be if, as absurd as it may sound, there were no polymers in the present or future. The objective was to encourage an improved understanding of the significance of polymers and polymeric materials to everybody's quality of life.

The Polymer Division contacted polymer societies around the globe and received numerous entries for both the essay and video competition. A panel of distinguished polymer chemists selected three winning videos and three winning essays were selected. These are posted on the IUPAC Polymer Education website at <www.iupac.org/polyedu>.

The winners in the video category are as follows:

1. **Yvonne Choo Shuen Lann**, 1st place (Asia). Yvonne recently finished high school and is pursuing her first-year degree in Pure Chemistry at Universiti Sains Malaysia.
2. **Andre Gomes & friends**, 2nd place (Europe). Andre was part of a group of five teenagers who just wanted to have some fun while studying polymers for chemistry class.
3. **Carol Newby & Melissa Kunkel**, 3rd place (North America). Carol is a graduate student at Cornell University. Melissa was a senior at Cornell majoring in Materials Science and Engineering. This video was written and edited by Melissa, while Carol helped film the movie and did some of the voiceovers.

Stills from the video by Yvonne Choo Shuen Lann, which won first prize in the IUPAC Polymer Division's IYC 2011 video competition.

The winner of the "A World without Polymers?" video contest poses with members of the IUPAC Polymer Division and members of the Malaysian delegation. Front (from left): Mrs. Lann, Yvonne Lann, Zuriati Zakaria; back (from left): Jung-Il Jin, Dennis Smith, Mr. Lann, Christopher Ober, Robert Stepto, Majda Zigon, and Ting-Kueh Soon.

The winners in the essay category are as follows:

1. **Charlotte Stenman** (Europe). Charlotte is a high school student in Sweden and was one of several entries from her English class.
2. **Emmanuel Ochoche Peter** (Africa). In 2009, Emmanuel obtained his Master's Degree in Analytical Chemistry at the Bayero University Kano, Kano State, Nigeria.
3. **Marylou Dauch, Bérengère Escuyer, Angélique Lebon, and Magali Reynard** (Europe). All four students in this group have graduated from high school and are in the midst of further chemistry studies, largely planning for careers in industry.

Each winning entry earned a year's subscription to *Chemistry International* and a copy of the IUPAC Polymer Division's Purple Book, generously provided by the publisher, the Royal Society of Chemistry. The first-place winners in each category were invited to attend the 2011 IUPAC Congress in San Juan. The six winning individuals and groups were announced at a formal ceremony held at the Symposium for Younger Polymer Chemists.

First-place winner Yvonne Choo was able to take part in the ceremony. Also in attendance were her family and members of the Malaysian delegation. During the ceremony officiated by Christopher Ober, president of the IUPAC Polymer Division, Yvonne spoke briefly about the creation of her video and held a screening of the video which was enjoyed by all in attendance. A recording of the ceremony and her video can be found at <www.iupac.org/polyedu/page42/styled-14/styled-15>.

As a sign of how social media is changing interactions, Yvonne met the winner of the Physical and Biophysical Division's Student Chemistry Cartoon Competition (see p. 22), Jessica Hough, on Facebook and the two winners spent time together at the Congress, attending talks on energy and sustainability.

www.chemistry2011.org/participate/activities/show?id=1139

The Global Stamp Competition

After six months and 247 submissions from 18 countries, the winners of the International Year of Chemistry Global Stamp Competition have been announced:

12–14 age group: **Vasilena Vasileva (14) from SOU Hristo Botev, Gorna Malina, Bulgaria**

15–18 age group: **Muzhafar Hassan Ismail (17) from MARA Junior Science College, Taiping, Malaysia**

Undergraduates: **Peter Yousef M. Rubio (18) from Santo Tomas University, Manila, Philippines**

Runners Up in the 15–18 age group:

- Stavrou Maria, Spyrou Chrisia, and Stylianou Chrysovalento (Cyprus)
- Luqman Safwan Che Mohd Fauzi (Malaysia)
- Kyle Stratford and Max Willinger (USA)

Headed by Lida Schoen and Christiane Reiners of the IUPAC Committee on Chemistry Education (CCE), the competition was launched in Paris last January during the IYC 2011 opening ceremony at UNESCO Headquarters. **"Chemistry as a Cultural Enterprise"** was the theme of the competition; all entries were required to highlight the impact of chemistry on a country's culture and everyday life. Designs were judged for their artistic value, how well they showed the relationship between chemistry and the national/regional culture, and the quality of the description (max. 50 words). The competition benefited greatly from social media: the site students used to upload their submissions allowed for sharing of comments and reviews. In so doing, the competition itself became a social and cultural enterprise. In fact, among the criteria used by the judges were the number of hits and number and quality of the peer reviews on the site.

Due to a generous gift of GlaxoSmithKline the winners received $500 and the runners up $250 (for the group). A selection of the best designs will be on display during the IYC Closing Ceremony in Brussels. Cyprus issued a customized stamp with the runner-up design and the National Dutch Postal Services did the same with the Dutch winners' design.

The international jury consisted of Prof. Morton Hoffman (CCE NR USA, ACS), Dr. Rachel Mamlok-Naaman (CCE NR Israel), Dr. Lynn Hogue (ACS), Datuk Dr. Soon Ting Kueh (CCE NR Malaysia, IKM, FACS), Dr. Anthony Smith (EC2E2N), Dr. Harry Kelly (GlaxoSmithKline), and Prof. Daniel Rabinovich (USA, stamp expert).

This IYC activity enjoy the support of IUPAC, the American Chemical Society, GlaxoSmith Kline, The European Chemistry and Chemical Engineering Education Network, the Institut Kimia Malaysia (IKM), and Jeff Howson (E2BN.org).

www.chemistry2011.org/participate/activities/show?id=110

Winner 12–14: Vasilena Vasileva, Bulagaria

"Bulgaria is famous for its production of rose oil. It is produced by double distillation of various types of roses (*Rosa damascena, sempervirens, moschata, centifolia*). The vast majority of rose oil produced in Bulgaria comea from the *Rosa damascena* rose grown near the town of Kazanlak, situated in the Rose Valley. The conditions in the valley are the most suitable for growing these roses; from them the best quality of oil is obtained and widely used in perfumes, due in part to the 300 different chemical substances found in the extracted rose oil."

Merihan Alaa (Egypt)

Yeh Ying Chen, Taiwan

Winner 15-18: Muzhafar Hassan Ismail, Malaysia

"This is the remarkable icon of Malaysia. Rubber is actually a plant originated from Brazil, but it was brought to Asia by Singapore. Despite the limited land for plantations, it was then planted in Malaysia. Back then, it was "White Gold" that people were hunting for, instead of the black gold of today (the petroleum). Soon after its introduction, rubber plantations spread all over Malaysia. This valuable commodity was essential to the country's growth. Today, maybe rubber is not regarded as the White Gold anymore, but its remarkable story lives on . . ."

Winner undergraduates: Peter Yuosef, Philippines

"My stamp is about the benefits of coconut and its contributions to science and industry. The coconut tree is considered to be the tree of life because of its many benefits to people and the environment. An important breakthrough in the field of medicine is the discovery that lauric acid, found in the coconut fruit, can fight the HIV virus. Bio-diesel from coconut trees is also another great discovery which could replace fossil fuels and help the environment."

Stavrou Maria (Cyprus), Runner-Up 15–18

Kyle Stratford (USA) Runner-Up 15–18

Erica Lind, Paulina Jaêhde, Frida Richter, Erika Kankkunen (Sweden)

Luqman Fauzi (Malaysia) Runner-Up 15–18

Tatiana Tikhonova (Russia)

Maria Pulido (Colombia)

Malta Conferences Foundation Established

A not-for-profit organization, the Malta Conferences Foundation (MCF), was incorporated on 1 June 2011 in the District of Columbia for the purpose of organizing the biennial Malta Conferences, "Frontiers of Chemical Science: Research and Education in the Middle East." These conferences were established to bring scientists from Middle Eastern countries together with the goal of using science as diplomacy to build a bridge to peace, tolerance, and understanding among the nations of the Middle East.

The Malta Conferences, so-called because the first two (Malta I and II) were held on the Mediterranean island of Malta in 2003 and 2005, have more recently been held in Istanbul, Turkey (Malta III), and Amman, Jordan (Malta IV), in 2007 and 2009 respectively. In December 2011, Malta V will take place at UNESCO headquarters in Paris, France, as the last event at that venue in celebration of the International Year of Chemistry.

IUPAC has been a cosponsor of the Malta Conferences since their start, supporting them intellectually and financially. IUPAC Presidents Pieter Steyn (2003), Leiv Sydnes (2005), and Bryan Henry (2007) attended the Malta Conferences in those years, representing IUPAC. Sydnes now serves as a member of the Board of Directors of the Foundation.

Science: The common language. (Photo by Jeff Wade.)

The Malta Conferences have brought together scientists from 15 nations of the Middle East: Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Palestinian Authority, Qatar, Saudi Arabia, Syria, Turkey, and United Arab Emirates. Many of these scientists cannot otherwise meet face-to-face because their governments are hostile to each other. Progress from the four earlier conferences can be measured in terms of the creation of a working group on Regional Water Quality Assessment with members from Jordan, Palestinian Authority, Israel, Egypt, and Kuwait (with advisors from the USA and European Union, and funding from IUPAC); the next step is to extend the project to Syria and Lebanon. In addition, multinational collaborative research projects on solar energy conversion and storage, and regional workshops on science curricula, laboratory materials, green chemistry, and chemical safety and security are in progress.

Each conference is characterized by plenary lectures delivered by 5 or 6 Nobel Laureates (e.g., Aaron Ciechanover, Dudley Herschbach, Claude Cohen-Tannoudji, Richard Ernst, Robert Grubbs, Walter Kohn, Roald Hoffmann, Yuan Tseh Lee, Sherwood Rowland, Jean-Marie Lehn, Rudolph Marcus, Tim Hunt, and Ada Yonath). Workshops on topics of importance in the Middle East (e.g., alternative energy sources, nanotechnology and material science, medicinal chemistry and natural products, environment: air and water quality, and science education at all levels) and poster sessions are conducted at which approximately 90 participants can display the results of their scholarly activities in an open and collegial forum.

Articles about the previous Malta Conferences have been published in the *U.S. Congressional Record*, *Chemical & Engineering News* (ACS), *Chemistry International (IUPAC)*, *Chemistry World* (RSC), and the *Washington Report on Middle East Affairs*, among others. Links to these articles can be found on the MCF website.

The MCF officers, Zafra Lerman (president), Ann Nalley (vice president), Paul Walter (vice president), Howard Peters (secretary), and Morton Hoffman (treasurer) are members of the Board of Directors. The Foundation is dedicated to obtaining funds to support Malta V and future conferences from private and government agencies and foundations, scientific societies, and individual and corporate contributors. Details about making a personal contribution can be found on the MCF website.

www.maltaconferencesfoundation.org

ICSU and Rio+20

Rio+20, the United Nations Conference on Sustainable Development that is to take place in Brazil on 4–6 June 2012, will mark the 20th anniversary of the 1992 UN Conference on Environment and Development, held in Rio de Janeiro, and the 10th anniversary of the 2002 World Summit on Sustainable Development held in Johannesburg. For the occasion, ICSU, the International Council for Science, is co-organizing partner for the Scientific and Technological Community Major Group, together with the World Federation of Engineering Organizations.

This is one of nine Major Groups (non-governmental stakeholder groups) which will participate alongside governments in the Rio+20 conference, and in all stages of the preparatory process for the conference. These Major Groups are identified in Agenda 21 (Rio 1992), and consist of the following: women, youth and children, indigenous peoples, non-governmental organizations, local authorities, workers and trade unions, business and industry, farmers, and the scientific and technological community.

ICSU therefore has a key role to play in Rio+20, as it is jointly responsible for representing the knowledge, needs, and concerns of the scientific and technological community. This includes the full range of scientific disciplines, including the natural, social, health, and engineering sciences, and the humanities. ICSU has a number of key objectives for Rio+20, and key issues which it wishes to address:

- highlight the urgent need for greater action on sustainable development
- ensure that policy recommendations resulting from Rio+20 integrate the best available knowledge from across the natural, social, and engineering sciences
- emphasize that strengthening science and technology will be essential for accelerating the implementation of sustainable development
- ensure that the needs of the international and national research community are recognized, and that support is given to research, training and monitoring programs that address sustainable development

Key issues:

- Natural science, social science and technology together have crucial roles in finding solutions to the challenges of sustainable development.
- A much greater proportion of research must be solution-oriented and interdisciplinary, addressing the integrated social, economic, and environmental pillars of sustainable development.

RIO+20
United Nations Conference on Sustainable Development

- Research agendas must be defined through broad-based, participatory approaches involving those in need of scientific information. The scientific and technological community must improve cooperation with other parts of civil society, the private sector, governments, and intergovernmental bodies.
- Improving science education and capacity-building, for women and men, is essential, as is bridging the North-South divide in scientific and technological capacity.
- Improving public access to scientific data and information, and data sharing between scientists, is crucial for sustainable development.

In preparation to this major event, ICSU aims to work with its members to ensure that coordinated messages from the science community are brought to Rio+20 through numerous avenues. Some of ICSU's members, including IUPAC, have submitted statements for Rio+20, which ICSU will draw on for its oral and written submissions to the Rio+20 process.

www.icsu.org/rio20/icsu-members

CHEMRAWN VII Prize for Atmospheric and Green Chemistry

The CHEMRAWN VII Prize for Atmospheric and Green Chemistry was established in 2009. The first prize was awarded in 2010 at the 3rd IUPAC International Conference on Green Chemistry held in Ottawa, Canada. The Call for Nominations for the 2012 prize is now open—submissions must be received by 15 March 2012.

The prize of USD 5000 is granted to a young investigator (younger than 45) from a developing country who is actively contributing to research in green chemistry and atmospheric chemistry. Each nomination should include a CV and two letters of support, plus a brief summary of accomplishments illustrating the contributions of the applicant to research in the area. Complete applications should be sent to the IUPAC Secretariat by e-mail to <secretariat@iupac.org>.

The Selection Committee comprises the chair of the CHEMRAWN Committee, the president of the Organic and Biomolecular Chemistry Division, and the chair of the Subcommittee on Green Chemistry. The next award will be presented at the 4th IUPAC International Conference on Green Chemistry, Foz do Iguaçu, Brazil, 25-29 August 2012.

www.iupac.org/web/nt/2011-09-23_CHEMRAWN_VII_Prize

IUPAC-ThalesNano Prize in Flow Chemistry

The IUPAC-ThalesNano Prize, established in 2011, is to be awarded to an internationally recognized scientist whose activities or published accounts have made an outstanding contribution in the field of flow chemistry in academia or industry. The award will be presented for the first time in 2012 at a IUPAC-sponsored conference at which the award recipient will be asked to give a plenary lecture on the subject of his/her research. The prizewinner will receive USD 7500 and a contribution to travel expenses.

The prize was established by a generous gift from the Hungarian Technology company ThalesNano Inc. to acknowledge the key role that flow chemistry plays in the improvement of chemical processes.

Submissions should be received by nomination only, with just one person needing to serve in that capacity, although a total of five (5) individuals should be listed as referees overall. The package must be submitted electronically and should contain a complete résumé, a professional autobiography of not more than two pages, and a one-page summary of what the individual considers to be his/her activities, accomplishments, and/or publications that have had the most significant impact upon the field of flow chemistry.

For more information contact Michael Droescher, chair of the IUPAC Committee on Chemistry and Industry, at <m.droescher@t-online.de>.

Nomination materials must be submitted by 31 January 2012 to the IUPAC Secretariat <secretariat@iupac.org>.

www.iupac.org/web/nt/2011-09-29_2012_IUPAC-ThalesNano_prize

How Youth Drive Change

"Five years away from the 2015 target date for achieving the Millennium Development Goals, it is more important than ever to encourage young people to dedicate themselves to achieving a more just and sustainable world," wrote Irina Bokova, director-general of UNESCO, as she launched the International Year of Youth (August 2010–August 2011) and International Youth Day (12 August).

Proclaimed in December 2009 by the UN General Assembly, the international year puts the accent on dialogue and mutual understanding. It aims to promote the ideals of peace, respect for human rights and solidarity between generations, cultures, religions, and civilizations. The Year turned out to be more revolutionary than expected. At the beginning of 2011, young people rose up in Tunisia and then in Egypt, and the movement spread to other countries in the region, also rousing countries in Europe such as Spain. Elsewhere in the world, youth are mobilizing for a range of causes, as varied as the means they use. Much more involved than we tend to think, young people have decided to take things into their own hands. And in the July-Sept. 2011 issue of the ***UNESCO Courier***, it is the youth who are speaking out, expressing their concerns and explaining their actions.

www.unesco.org/new/en/unesco-courier

The World's Largest-Ever Chemistry Experiment

As of September 2011, an estimated 100 000 students from over 45 countries had already joined what is being described as "the world's largest chemistry experiment." This global experiment, "Water: A Chemical Solution," explores the chemistry of water and the role of water in society and the environment. The Global Experiment, a joint effort of IUPAC and UNESCO, is a cornerstone activity of the International Year of Chemistry.

The experiment consists of four component activities, each of which can be carried out by children of all ages in schools around the world. The activities are adaptable to the skills and interests of students of various ages and use equipment that is widely available. The results, submitted by thousands of students, are available at <water.chemistry2011.org> as an interactive global data map—demonstrating the value of international cooperation in science.

"The shared quantity of data that we will be able to produce will be of great interest and value. Scientists are always after standards that we can measure against. No one has done anything like this before with the world's pH," said Declan Fleming, an RSC School Teacher Fellow, on the BBC's radio show Science in Action.

Javier Garcia-Martinez (center) poses with chemistry graduate students demonstrating the Global Water Experiment at the Festival de Quimica in Old San Juan on Sunday, 31 July. Garcia chairs the IUPAC task group that developed the experiment.

The activities have been carefully selected in order to provide students, especially in developing countries, with an appreciation of chemical investigation and data collection and validation. RSC president David Phillips said of the project: "This remarkable initiative will demonstrate the enjoyment gained from practical experimentation."

One of the main objectives of the Global Experiment is to allow educators and students from all around the world to interact using social media and share experiences, news, and pictures. The most popular social tools like Twitter and Facebook are fully integrated in the website as are several You Tube videos about the experiment.

After more than a year of dedicated planning and implementation, the project launched successfully at the UN World Water Day, 20–22 March in Cape Town, South Africa. Hundreds of 15–18-year-old students from Cape Town townships carried out experiments to test water quality, measure salinity and acidity, and learn how water is filtered and distilled. During the "Big Splash," which coincided with the South African National Water Week, students were exposed to different activities that emphasized the importance of water in their city.

Great efforts have been made to make the Global Experiment a truly global activity. The website is available in five languages: English, French, Spanish Chinese, and Russian.

From the very beginning it was clear that if the Global Experiment was to be truly global it needed to be made available to every school, even to those without the most basic materials. In order to encourage the participation of low-income communities, 150 schoolpacks containing 10 Global Water Kits and a School Resource Kit have been sent to over 30 countries for free. The kits can be purchased from the Radmaste Centre at the University of Witwatersrand in South Africa <www.radmaste.org.za>.

This could be the first- and largest-ever crowdsourcing chemistry experiment, but for sure it is already a great educational activity that aims to educate and engage young people on the key role of science in the future of this planet.

water.chemistry2011.org

Stable Isotope-Ratio Guidelines Aid Forensic Science

The isotopic abundances (and atomic weights) of numerous elements (e.g., H, B, Li, C, N, O, Si, S, Ca, Fe, and Tl) vary in naturally occurring substances because molecules, atoms, and ions having different stable isotopes of the same chemical element possess slightly different physical and chemical properties. These elements commonly will be fractionated during physical, chemical, and biological processes, giving rise to variations in isotopic composition. Increasingly these variations in isotopic composition are being used in anthropology, atmospheric sciences, biology, chemistry, environmental sciences, food and drug authentication, forensic science, geochemistry, geology, medicine, oceanography, and paleoclimatology.

IUPAC's Commission on Isotopic Abundances and Atomic Weights recognized that there was a lack of consensus on how to conduct such mass spectrometric measurements and how to express measurement results in stable isotope studies. Variations in isotopic compositions are relatively small. Typically, the difference in the ratio of the number of two stable isotopes in a specimen is compared with that in an internationally agreed reference material, and the result is reported as a delta value (δ). These values commonly are expressed in part per thousand (per mil, with symbol ‰). To improve mass spectrometric measurements and expression of their results, a project on guidelines for mass spectrometric isotope ratio measurements (2001-019-2-200) was begun in 2002. Under this project, papers have been published on mass spectrometric correction procedures and on recommendations for the inclusion of systematic errors in the publication of such measurements. The final paper in support of this project has been published in *Rapid Communications and Mass Spectrometry* titled "Guidelines and recommended terms for expression of stable-isotope-ratio and gas-ratio measurement results."[1] These guidelines:

- Are based on publications of the Commission on Isotopic Abundances and Atomic Weights, with input from more than 30 subject-matter experts.
- Provide examples of stable isotope measurement results consistent with the Système International d'Unités, the SI (known in English as the International System of Units), and the third edition of the *International Vocabulary of Basic and General Terms in Metrology* (VIM, 3rd edition).
- Encourage the use of and provide examples of stable-isotope-delta definition equations that are coherent quantity equations, where the extraneous factors 100, 1000, and 1000 000 have been removed.
- Recommend and provide examples for expression of stable isotope and gas-ratio measurements using the symbols for dimensionless quantities, per mil (‰), part per million (ppm), and per meg (one part in a million parts), while recommending that mmol/mol (and similar units) be deprecated for expressing values of δ.
- Provide examples of column headings and axis labels for stable isotope and gas-ratio measurements consistent with quantity calculus.
- Recommend the analysis of international distributed isotopic reference materials along with sample unknowns and the publication of measurement results of the reference materials with sample unknowns.

The application of these guidelines in forensic science is shown in Figure 1, which is a plot of the

hydrogen isotopic composition versus oxygen isotopic composition of tap water and of human scalp hair, primarily in North America. The spatial variation in isotopic composition of tap water is well documented and is a function primarily of temperature of formation of precipitation in clouds. Thus, groundwater and surface water (and tap water) is a function of elevation, distance inland from an ocean, etc. Tap water at the lower right of the figure derives from high elevations (e.g., Rocky Mountains), whereas tap waters near the top of the figure are illustrative of more equatorial sources. This figure shows that the hydrogen and oxygen isotopic composition are strongly correlated in tap water and scalp hair. Correlations in isotopic composition between tap water and scalp hair are used in human migration studies, in anthropology, forensic science, and potentially, for geospatial tracing of individuals. A fundamental problem was that the original human hair measurements,[2] shown in the lower right of Figure 1, were not provided with isotopic compositions of reference materials available to the scientific community and were not calibrated satisfactorily to the stable hydrogen and oxygen isotope scales. Subsequently, Coplen and Qi[3] prepared human hair isotopic reference materials for international distribution and improved analytical techniques. Following IUPAC guidelines,[1,4] the hydrogen isotopic composition of human hair, shown in cyan in Figure 1, was found to be on average about 34 ‰ more positive than that of the original measurements on human hair.[2] A major conclusion of this study is that readers need to pay attention to the hydrogen and oxygen isotopic compositions of isotopic reference materials in publications, and they may need to adjust these measurement results in previous publications, as needed, to ensure that all results are on the same isotope scales.

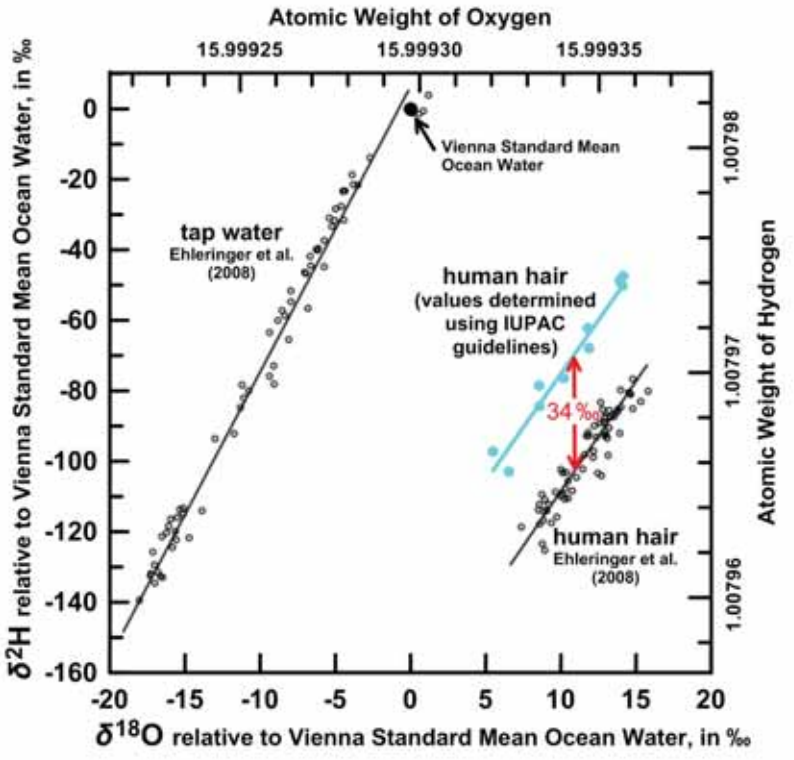


Figure 1. Hydrogen isotopic composition (δ^2H) versus oxygen isotopic composition ($\delta^{18}O$) of tap water and human scalp hair relative to Vienna Standard Mean Ocean Water. Open black circles are from Ehleringer et al.,[2] and solid cyan circles are from Coplen and Qi[3] and they use the guidelines developed in this project and IUPAC guidelines published in 1994.[4]

For more information, contact Task Group Chair Thomas Walczyk <walczyk@nus.edu.sg>.

www.iupac.org/web/ins/2001-019-2-200

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Morphology Development of Polytetrafluoroethylene in a Polypropylene Melt (IUPAC Technical Report)

Mohd Amran Bin Md Ali, Shogo Nobukawa, and Masayuki Yamaguchi

Pure and Applied Chemistry, 2011
Vol. 83, No. 10, pp. 1819–1830

Morphology development of polytetrafluoroethylene (PTFE) caused by applied flow history in molten isotactic polypropylene (PP) is investigated, employing a cone-and-plate rheometer and a capillary rheometer as mixing devices. Since the flow history is applied at 190 °C, PTFE is in the solid state whereas PP is in the molten state. It is found that primary PTFE particles tend to be agglomerated together by mechanical interlocking. Then they are fragmented into fibers by hydrodynamic force with reorganization process of crystalline phase. The diameter of the fragmented fibers is the same as that of the original ellipsoidal particles. Further, fine fibers whose diameter is in the range from 50 to 100 nm are also generated by yielding behavior of the particles. The prolonged shearing leads to a large number of fibers, although the diameter and length are hardly affected by the exposure time of shearing and shear stress. Moreover, the flow type (i.e., drag or pressure flow) does not affect the morphology to a great extent, although the drag flow is not efficient to reduce large agglomerated particles. The fibers form an interdigitated network structure, which is responsible for the marked melt elasticity.

http://dx.doi.org/10.1351/PAC-REP-11-01-10

Definitions of Terms Relating to Crystalline Polymers (IUPAC Recommendations 2011)

Stefano V. Meille, Giuseppe Allegra, Phillip H. Geil, Jiasong He, Michael Hess, Jung-Il Jin, Pavel Kratochvíl, Werner Mormann, and Robert Stepto

Pure and Applied Chemistry, 2011
Vol. 83, No. 10, pp. 1831–1871

Recommendations are given concerning the terminology relating to the structure and the morphology of crystalline polymers and the processes of polymer crystallization. They are applicable to cases where polymer crystals are a significant fraction of a system and primarily with crystal structures that are comprised of polymer chains with limited, static, or dynamic disorder. After some general definitions, terms pertaining to structural arrangements at subnanometric scales and to polymer crystal structures are defined. Terms relating to molecular conformation within polymer crystals, morphological aspects, and polymer crystallization are given in subsequent sections.

http://dx.doi.org/10.1351/PAC-REC-10-11-13

Standards for Photoluminescence Quantum Yield Measurements in Solution (IUPAC Technical Report)

Albert M. Brouwer

Pure and Applied Chemistry
ASAP online 2011-08-31
doi:10.1351/PAC-REP-10-09-31

For any photoluminescent species, the quantum yield (QY) of its luminescence is a basic property, and its measurement is an important step in the characterization of the species. According to the definition of the QY, only two quantities need to be known, viz. the number of photons absorbed and the number of photons emitted per unit of time. Unfortunately, reliable measurements of these quantities can be hard to obtain. In this paper, the use of standards for the measurement of photoluminescence QYs in dilute solutions is reviewed. Only three standards can be considered well established. Another group of six standards has been investigated by several independent researchers. A large group of standards is frequently used in recent literature, but the validity of these is less certain. The needs for future development comprise: (i) confirmation of the validity of the QY values of many commonly used standard materials, preferably in the form of SI traceable standards; (ii) extension of the set of standard materials to the UV and near-IR spectral ranges; and (iii) good standards or robust protocols for the measurements of low QYs.

http://dx.doi.org/10.1351/PAC-REP-10-09-31

Extension of ThermoML: The IUPAC Standard for Thermodynamic Data Communications (IUPAC Recommendations 2011)

Michael Frenkel, et al.

Pure and Applied Chemistry, 2011
Vol. 83, No. 10, pp. 1937–1969

ThermoML is an XML-based approach for storage and exchange of experimental, predicted, and critically evaluated thermophysical and thermochemical property data. Extensions to the ThermoML schema for the representation of speciation, complex equilibria, and properties of biomaterials are described. The texts of 14 data files illustrating the new extensions are provided as Supplementary Information together with the complete text of the updated ThermoML schema.

http://dx.doi.org/10.1351/PAC-REC-11-05-01

Terminology of Polymers and Polymerization Processes in Dispersed Systems (IUPAC Recommendations 2011)

Stanislaw Slomkowski, et al.

Pure and Applied Chemistry
ASAP online 2011-09-10
doi:10.1351/PAC-REC-10-06-03

A large group of industrially important polymerization processes is carried out in dispersed systems. These processes differ with respect to their physical nature, mechanism of particle formation, particle morphology, size, charge, types of interparticle interactions, and many other aspects. Polymer dispersions, and polymers derived from polymerization in dispersed systems, are used in diverse areas such as paints, adhesives, microelectronics, medicine, cosmetics, biotechnology, and others. Frequently, the same names are used for different processes and products or different names are used for the same processes and products. The document contains a list of recommended terms and definitions necessary for the unambiguous description of processes, products, parameters, and characteristic features relevant to polymers in dispersed systems.

http://dx.doi.org/10.1351/PAC-REC-10-06-03

Letters About the IUPAC-IUGS Common Definition and Convention on the Use of the Year as a Derived Unit of Time

A set of recommendations jointly prepared by IUPAC and the International Union of Geological Sciences (IUGS) was recently published in *Pure and Applied Chemistry* (2011, Vol. 83, No. 5, pp. 1159–1162), which triggered a couple of letters to *Chemistry International*. The recommendations abstract reads as follows:

The units of time (both absolute time and duration) most practical to use when dealing with very long times, for example, in nuclear chemistry and earth and planetary sciences, are multiples of the year, or annus (a). Its proposed definition in terms of the SI base unit for time, the second (s), for the epoch 2000.0 is 1 a = 3.1556925445 × 10^7 s. Adoption of this definition, and abandonment of the use of distinct units for time differences, will bring the earth and planetary sciences into compliance with quantity calculus for SI and non-SI units of time.

In one letter, L.E. Edwards argues that neither a year nor an annus can be a derived unit in the SI. Instead, she states, SI derived units are products of powers of base units. In a separate letter, N. Christie-Blick argues that what is at stake is whether or not a necessary distinction exists between geohistorical dates and unconstrained spans of geological time.

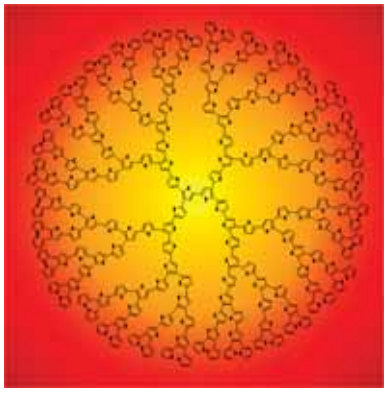
Both letters, in full, and the invited reply by the IUPAC/IUGS task group are online as a supplement to this issue. While responding, the task group stated that "What a scientific convention can do is point to what is considered correct as a result of very long and very careful evaluations of all possible arguments that are available at a given time after weighing of their merits."

www.iupac.org/publications/ci/2011/3306/pac_letters-sup.html

Novel Aromatic Compounds

by Shih-Yuan Liu and Michael Haley

The **14th International Symposium on Novel Aromatic Compounds** (ISNA-14) was held 24–29 July in Eugene, Oregon, USA, on the campus of the University of Oregon. Over 250 participants from 21 countries were present, making this gathering the largest ISNA conference on North American soil. The scientific program consisted of the 2011 Nozoe Lecture presented by Peter Bäuerle (University of Ulm, Germany), 11 plenary lectures, 20 invited lectures, 29 contributed lectures, and 160 posters presented in two sessions. This IUPAC-sponsored symposium was organized by Michael M. Haley (University of Oregon) and Benjamin T. King (University of Nevada, Reno, USA).



Dendritic Oligothiophenes, courtesy of Peter Bäuerle.

The ISNA symposium series was initiated by Tetsuo Nozoe, who hosted the inaugural conference in Sendai, Japan in 1970. In the years since, the series has flourished and is now held biennially at locations across Europe, Asia, and North America. The focus of ISNA is to highlight recent advances in the area of aromatic chemistry, including the synthesis and properties of novel aromatic compounds, applications of π-conjugated systems in materials and devices, and new experimental and theoretical studies of the fundamental concept of aromaticity. By bringing together the top researchers from across the globe, along with a cadre of young professors and Ph.D. students, INSA aims to be a catalyst for the generation of new ideas, insights, applications, and directions in this exciting and growing field of chemistry.

Peter Bäuerle, the 2011 Nozoe Memorial Lecturer.

Because of his stature within the ISNA family of chemists, the memory of the late Prof. Nozoe is honored with the ISNA Nozoe Lecture. The extended community of Nozoe students and friends in Japan, led by Prof. Shô Itô, helped establish the Nozoe lecture at ISNA-9. The Nozoe lecture has been held at every ISNA meeting since. The responsibility for selecting each Nozoe Lecturer currently resides with the International Committee for the Nozoe Lectureship, comprised of some of his former students and friends.

Former presenters of the Nozoe Lecture include such luminaries as Atsuhiro Osuka (ISNA-13, 2009), François Diederich (ISNA-12, 2007) and Koichi Komatsu (ISNA-11, 2005). Peter Bäuerle from the University of Ulm, Germany was chosen as the 2011 Nozoe Lecturer for ISNA-14. Prof. Bäuerle has been active in the field of aromatic chemistry for many years and his recent research has focused on the development of novel organic semiconducting and conducting materials based on thiophene. Bäuerle is currently the director of the Institute for Organic Chemistry II and Advanced Materials at the University of Ulm. His research results have been published in over 240 peer-reviewed scientific papers, 8 book chapters, and 7 patents, and in 2000 he was awarded the René Descartes Prize of the European Union. For the ISNA-14 Nozoe Lecture, Bäuerle discussed recent progress his group has made on the synthesis and characterization of macromolecular dendridic oligothiophenes, and presented exciting data which indicate that these conjugated materials could find application in high-performance organic solar cells.

In addition to Bäuerle's Nozoe Lecture, the scientific program of ISNA-14 included plenary lectures from 11 noteworthy scientists. To highlight just a handful, Jeffery Moore (University of Illinois at Urbana-Champaign, USA) presented the first plenary lecture, about recent work on shape-persistent arylene ethyn-

The student poster prize winners with their awards and books (left to right): Mike Haley (ISNA-14 chair), Peter Goelitz (Wiley-VCH), Brian Wall, Rebecca Parkhurst, Hajime Shigemitsu, Bharat Kumar, and Ben King (ISNA-14 co-chair).

ylene macrocycles—discrete molecules whose properties can emulate high polymers with better control of covalent, supramolecular, and condensed phase organization.

Harry Anderson (Oxford University, UK) described Vernier templated porphyrin-based molecular wires, including double-stranded annulene sandwiches that can be regarded as model light harvesting systems. Toshikazu Hirao (Osaka University, Japan) discussed the novel π-bowl sumanene, which feature a C_{3v} symmetric structure present in fullerenes and carbon nanotubes. Finally, as testament to the diversity of topics covered at ISNA-14, Miguel Garcia-Garibay (University of California, Los Angeles, USA) presented the synthesis of crystalline molecular gyroscopes based on trityl derivatives as a primary building block, and their structural and dynamic characterization in the solid state.

The organizers of ISNA-14 made a special effort to emphasize the contributions of young scientists working in the field of aromatic chemistry. To that end, several assistant professors, early in their independent research careers, were featured as invited lecturers. J.D. Tovar (Johns Hopkins University, Baltimore, Maryland, USA) presented his work on tuning aromaticity to promote intramolecular delocalization of charge carriers. Malika Jeffries-El (Iowa State University, Ames, USA) reported her efforts to modify the optical and electronic properties of benzobisoxazoles by systematic substitution at the 4- and 8-positions. To highlight the work of even younger chemists, Nancy Mills (Trinity University, San Antonio, Texas, USA) presented her study of antiaromatic ions as probes of delocalization, work that has been performed primarily by undergraduate students.

The itinerary for ISNA-14 also included time to enjoy the natural beauty of western Oregon around the Eugene area. A group trip to the Pacific coast, about an hour from town, included stops at the picturesque Heceta Head Lighthouse and the Oregon Coast Aquarium. Oregon is a well-known wine country and the conference banquet was held at Sweet Cheeks Winery, 15 miles south of Eugene. The organizers ensured that the notoriously fickle Oregon weather cooperated with the conference schedule and banquet attendees enjoyed a wonderful summer evening in a beautiful setting, with delicious food and drink.

The banquet was also the site of the poster award ceremony. This year, four graduate students were honored: Bharat Kumar (King group, University of Nevada), Brian Wall (Tovar group, Johns Hopkins), Hajime Shigemitsu (Hisaki group, Osaka University) and Rebecca Parkhurst (Swager group, Massachusetts Institute of Technology).

Lastly, a fond farewell: Reginald Mitchell (University of Victoria, British Columbia, Canada) has been active in the field of aromatic chemistry for four decades and has been a fixture at nearly every ISNA gathering. Mitchell retired from the University of Victoria in 2010 and he delivered a stirring lecture at ISNA-14 summarizing his lifetime accomplishments studying dimethyldihydropyrene. His enthusiasm and charisma are contagious and his scientific prowess is second to none; we wish Mitchell a happy retirement and hope for a cameo appearance at INSA-15.

The next conference in this series, ISNA-15, will be organized by Ken-Tsung Wong (National Taiwan University) and will be held in Taipei, Taiwan, in the summer of 2013 <www.isna15.org>.

Shih-Yuan Liu <lsy@uoregon.edu> is assistant professor at the University of Oregon. Michael Haley <haley@uoregon.edu>, symposium chair, is a professor at the University of Oregon.

www.isna14.org

Where 2B & Y

FLOHET 2012

4–7 March 2012, Gainsviille, Florida, USA

Twelve previous FLOHET Conferences, held each March from 2000 through 2011, brought together the academic and industrial communities with an abundance of heterocyclic and synthetic chemistry reflecting the current interest in the subject. The program holds particular interest for the industrial chemical community where pharmaceuticals, agrochemicals, and colorants usually contain at least one heterocyclic ring.

The **13th Florida Heterocyclic and Synthetic Conference** continues the tradition of its highly successful predecessors, which will take place 5–7 March 2012 in Gainesville, Florida, USA. The conference will feature 11 plenary lectures given by academic and industrial experts from around the world together with invited lectures and short courses on heterocyclic topics. A poster session combined with a buffet supper will be held on the evening of 5 March. A wine reception and conference banquet are scheduled for the evening of 6 March. The conference closes with a farewell party on the evening of 7 March. Plenary lectures will be given b: Phil Baran, Ian Baxendale, Pat Confalone, Laurence Harwood, Oliver Kappe, David Kingston, Herbert Mayr, Eckhard Ottow, Andreas Pfalz, Brian Stoltz, and Peter Wuts.

See Mark Your Calendar on page 39 for contact information.

www.arkat-usa.org/conferences-flohet-others/

Carbohydrate

22–27 July 2012, Madrid, Spain

The **International Carbohydrate Symposium** is the most important event in carbohydrate chemistry and biochemistry, biennially organized under the auspices of the International Carbohydrate Organization. The 26th International Carbohydrate Symposium will cover all branches of modern glycosciences, from basic to applied research.

The call for abstracts is open from 1 October 2011 to 20 April 2012. Both oral presentations and posters will be presented at the venue.

ICS2012 will cover various fields of glycosciences, including Synthesis: Methods and Applications; Chemical Glycobiology; Analytical Methods; Therapeutics; Structural Glycobiology; Glycomics and Glycoinformatics; Materials and Biotechnology; and Industrial Applications

See Mark Your Calendar on page 40 for contact information.

www.ics2012madrid.com

Pesticide Science

15–20 September 2012, Beijing, China

The **4th International Symposium on Pesticide and Environmental Safety**, the 5th Pan Pacific Conference on Pesticide Science, and the 8th International Workshop on Crop Protection Chemistry and Regulatory Harmonization are one joint event in 2012. The workshop is jointly organized by IUPAC, the Beijing Society of Pesticide, and the Pesticide Science Society of Japan.

The workshop will focus on global views and harmonized approaches to pesticide regulation, pesticide residues in food and international trade standards, environmental safety assessment of pesticides, pesticide quality, manufacturing, specifications, new pesticide discovery and synthesis, formulation, and application techniques.

The workshop will bring together worldwide experts to seek applicability of internationally harmonized approaches to crop protection chemistry within the context of regional agricultural and world trade needs.

The official language of the congress will be English.

See Mark Your Calendar on page 40 for contact information.

www.2012iupac.com

Mark Your Calendar

Upcoming IUPAC-sponsored events
See also http://www.iupac.org/indexes/Conferences for links to specific event websites

2012

6–9 January 2012 • Polymers and Organic Chemistry • Doha, Qatar
14th International IUPAC Conference on Polymers and Organic Chemistry
Prof Hassan S. Bazzi, Science Program Coordinator, Texas A & M University at Qatar, P.O. Box 23874, Doha, Qatar
Tel.: +974 423 0018, Fax: +974 423 0060, E-mail: bazzi@tamu.edu

12–15 February 2012 • Polymer • Hobart, Australia
33rd Australasian Polymer Symposium
Prof Sébastian Perrier Director, Key Centre for Polymers and Colloids, School of Chemistry, University of Sydney, Sydney, NSW 2006, Australia, Tel.: +61 2 9351 3366, Fax: +61 2 9351 3329, E-mail: s.perrier@chem.usyd.edu.au

15–18 February 2012 • The Role of Chemistry for Sustainable Agriculture • Pusa, Delhi, India
2nd International Conference on Agrochemicals Protecting Crops, Health and Natural Environment
Dr. Najam A. Shakil, Indian Agricultural Research Institute, Division of Agricultural Chemicals, New Delhi 110 012, India, Tel.: +91 981 819 6164, Fax: +91 11 2584 3272, E-mail: iamshakil@gmail.com

4–7 March 2012 • Heterocyclic Chemistry • Gainesville, Florida, USA
13th Florida Heterocyclic and Synthetic Conference
Prof. Alan R. Katritzky, University of Florida, Department of Chemistry, Gainesville, FL, 32611-7200, USA
Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.fl.edu

26–30 March 2012 • Polymer Characterization • Dubrovnik, Croatia
20th International Conference on Polymer Characterization - World Forum on Advanced Materials
Dr Vera Kovacevic, University of Zagreb, Department of Chemical Engineering & Technology, Marulicev Trg., 19, HR-10000 Zagreb, Croatia, Tel.: +385 1 459 7188, Fax: +385 1 459 7260, E-mail: polychar20@fkit.hr

16–21 April 2012 • Chemical Sciences • Corfu, Greece
12th Eurasia Conference on Chemical Sciences
Prof Nick Hadjiliadis, University of Ioannina, Dept. of Chemistry, GR-45110 Ioannina, Greece
Tel.: +30 2 651 008 420, Fax: +30 2 651 008 786, E-mail: nhadjis@uoi.gr

20–25 May 2012 • Heteroatom Chemistry • Kyoto, Japan
10th International Conference on Heteroatom Chemistry
Prof. Norohiro Tokitoh, Kyoto University, Institute of Chemical Research, Gokasho, Uji, Kyoto 611-0011, Japan
Tel.: +81 774 38 3200, FAX: +81 774 38 3209, E-mail: tokitoh@boc.kuicr.kyoto-u.ac.jp

24–29 June 2012 • Macromolecules • Blacksburg, Virginia, USA
44th International Symposium on Macromolecules—IUPAC World Polymer Congress
Prof Timothy E. Long, Virginia Polytechnic University, Chemistry Dpt, VA 24061, USA
Tel.: +1 540 231 2480, Fax: +1 540 231 8517, E-mail: telong@vtu.edu

1–6 July 2012 • Organic Synthesis • Melbourne, Australia
19th International Conference on Organic Synthesis
Prof Mark Rizzacasa, University of Melbourne, School of Chemistry, The Bio21 Institute, Melbourne, Victoria 3010, Australia, Tel.: +61 3 3844 2397, Fax: +61 3 3947 8396, E-mail: masr@unimelb.edu.au

8–11 July 2012 • African Network of Analytical Chemists • Maputo, Mozambique
African Network of Analytical Chemists Analytical Chemistry Conference
Prof. Carvalho Madivate, University of Eduardo Mondlane, Department of Chemistry, Campus Universitario, Maputo 257, Mozambique, Tel.: +258 21 430 239, Fax: +258 21 304 405, E-mail: cmadivate@yahoo.com

15–20 July 2012 • Photochemistry • Coimbra, Portugal
XXIVth IUPAC Symposium on Photochemistry
Prof Hugh D. Burrows, University of Coimbra, Dept. of Chemistry, P-3004 535 Coimbra, Portugal
Tel.: +351 239 854 482, FAX: +351 239 827 703, E-mail: burrows@ci.uc.pt

15–20 July 2012 • Change in Chemistry Education • Rome, Italy
22nd International Conference on Chemical Education (ICCE) and 11th European Conference on Research In Chemical Education—Stimulating Reflection and Catalysing Change in Chemistry Education
Prof. Luigi Campanella, Conference Chair; Agency YES Meet, organizing secretariat
Tel: + 39 081 8770604, Fax: + 39 081 8770258, E-mail: info@iccecrice2012.org

Conference Call

22–27 July 2012 • Carbohydrate • Madrid, Spain
XVIth International Carbohydrate Symposium
Prof. Jesús Jiménez-Barbero, Centro de Investigaciones Biológicas, Consejo Superior de Investigaciones Ciencias, Ramiro de Maeztu 9, E-28040 Madrid, Spain
Tel.: +34 91 837 3112, Fax: +34 91 536 0432, E-mail: jjbarbero@cib.csic.es

5–10 August 2012 • Chemical Thermodynamics • Búzios, Brazil
22nd International Conference on Chemical Thermodynamics and 67th Calorimetry Conference
Prof. Watson Loh, Universidade de Estadual de Campinas, Instituto de Química, Caixa Postal 6154, Campinas, São Paulo 13083-970, Brazil, Tel.: +55 193 521 3001, Fax: +55 193 521 3023, E-mail: wloh@iqm.unicamp.br

25–29 August 2012 • Biomolecular Chemistry • Beijing, China
9th International Conference on Biomolecular Chemistry
Prof. Liangren Zhang, School of Pharmaceutical Sciences, Peking University Health Science Center, 38 Xueyuan Road, Beijing 100083, China, Tel.: +86 10 82 802 491, Fax: +86 10 82 802 638, E-mail: liangren@bjmu.edu.cn

25–29 August 2012 • Green Chemistry • Foz do Iguacu, Brazil
4th International IUPAC Conference on Green Chemistry
Prof. Vania Gomes Zuin, Federal University of Sao Carlos, Department of Chemistry, Rodovia Washington Luis, Sao Carlos, 1365-905, Brazil, Tel.: +55 163 361 8096, Fax: +55 163 361 8350, E-mail: vaniaz@ufscar.br

9–13 September 2012 • Physical Organic Chemistry • Durham, United Kingdom
21st International Conference on Physical Organic Chemistry
Professor Ian H. Williams, Department of Chemistry, University of Bath, Claverton Down, Bath BA2 7AY, United Kingdom, Tel.: + 44 1225 386 625, Fax: + 44 1225 386 231, E-mail: i.h.williams@bath.ac.uk

15–20 September 2012 • Pesticide and Environmental Safety • Beijing, China !!New Dates!!
4th International Symposium on Pesticide and Environmental Safety & 8th International Workshop on Crop Protection Chemistry and Regulatory Harmonization
Prof. Zhang Jing, China Agricultural University, Centre for Chemicals Applications Technology, Yuanmingyuan West Road, Beijing 100193, China, Tel.: +86 10 6273 1456, Fax: +86 10 6273 3688, E-mail: zj810515@163.com

15–20 September 2012 • Catalysis in Organic Synthesis • Moscow, Russia
International Conference on Catalysis in Organic Synthesis
Prof. Mikhail P. Egorov, Russian Academy of Sciences, Zelinsky Institute of Organic Chemistry, 47 Leninsky Prospekt, B-334, RF-119991 Moscow, Russia, Tel.: +7 095 135 5309, Fax: +7 095 135 5328, E-mail: mpe@ioc.ac.ru

16–21 September 2012 • Biotechnology • Daegu, Korea
15th International Biotechnology Symposium and Exhibition
IBS 2012 Secretariat, 6F, Sunghwa B/D, 1356-51 Manchon, 1-Dong, Suseong-Gu, Daegu 706-803, Korea
Tel.: +82 53 742 5557, Fax: +82 53 742 9007, E-mail: info@ibs2012.org

5–9 November 2012 • Mycotoxin • Rotterdam, Netherlands
7th World Mycotoxin Forum and XIIIth International IUPAC Symposium on Mycotoxins & Phycotoxins
Ms. Helena B. Bastiaanse (Program Coordinator), Bastiaanse Communication, P.O. Box 179, NL-3720 AD Bilthoven, Netherlands, Tel.: +31 302 294 247, Fax: +31 302 252 910, E-mail: helena@bastiaanse-communication.com

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An IYC Philatelic Tribute to Marie Curie

by Daniel Rabinovich

A pioneer in the field of radioactivity, Marie Curie was the first female professor at the prestigious Sorbonne in Paris and the first (and, to this date, the only) woman to receive two Nobel Prizes. Perhaps more significant, her legendary perseverance and dedication to research have inspired multiple generations of boys and girls to pursue careers in science, and Curie herself, characteristically reluctant to be in the spotlight, would have been particularly proud today of such a legacy. Thus, it is not surprising that the centennial of her Nobel Prize in Chemistry (1911) for the discovery of radium and polonium is not only one of the thematic pillars of the International Year of Chemistry, but a timely and well-deserved recognition of her enduring role in promoting the public's appreciation for chemistry and encouraging interest in the field among young people.

Marie Curie is undoubtedly one of the most celebrated scientists in history and her contributions to science have been honored in multiple ways. For example, several biographies of *Madame* Curie are available, starting with the very personal account published in 1937 by her youngest daughter Eve, which quickly became a bestseller in Europe and the United States. Many movies and documentaries have been made highlighting various aspects of Marie Curie's scientific career and personal life, and countless magazine articles have been written about her, including those comprising an entire issue of *Chemistry International* earlier this year. A myriad of streets, parks, schools, institutes, and universities throughout the world honor her memory, as do an assortment of coins, banknotes, and commemorative medals. In addition, the names of element 96 (curium) and one of the common units of radioactivity (the curie, symbol Ci) pay joint tribute to Marie and her beloved husband Pierre. There's even a crater named Skłodowska (i.e., Marie's maiden name) located on the far side of the Moon!

An abridged philatelic tribute to Marie Curie, whose likeness has appeared on more than 100 stamps and souvenir sheets, is presented herein. She is certainly in the "top 10" list of scientists most often portrayed on postage stamps, an illustrious cohort that includes the likes of Copernicus, Newton, and Einstein. Therefore, postage stamps represent a viable medium to highlight key aspects of her fascinating life and scientific accomplishments.

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The first stamp to depict Marie Curie [1] was issued in Turkey on 17 April 1935, less than a year after her tragic death from leukemia on 4 July 1934. It is part of an eclectic set of 15 stamps dedicated to promoting women's rights and the 12th Congress of the International Women's Alliance, which took place in Istanbul from 18–24 April 1935. Significantly, also featured on the set of stamps are fellow Nobel laureates Bertha von Suttner (Peace '05) and Selma Lagerlöf (Literature '08), both of whom were the first women to receive the coveted prizes in their fields.

The 40th anniversary of the discovery of radium by Marie and Pierre Curie was remembered in France in 1938 with the release of a stamp bearing a 50-cent surtax to benefit the International Union Against Cancer [2]. Although the original idea of the French Postal Service was that every country member of the Universal Postal Union would prepare a similar stamp, only Monaco [3] and Cuba [4] did so. This lack of response prompted France to issue stamps for 21 of its colonies (Cameroon, French Polynesia, Guadeloupe, Ivory Coast, Madagascar, New Caledonia, Senegal, etc.), with each stamp having an identical design except for the name of the colony.

More than 30 countries and territories have issued close to 80 stamps honoring Marie and/or Pierre Curie since then, including Albania [5], India [6], Liberia [7], Mali [8], Poland [9], Surinam [10], and Sweden [11].

A few additional stamps with a Curie theme have been issued recently (2011), although those from Bosnia and Herzegovina [12] and the British crown dependency of Jersey [13] unfortunately do not refer explicitly to the IYC, unlike those from France [14], North Korea [15], Paraguay [16], Spain [17], and Sri Lanka [18].

A philatelic tribute to Marie Curie would not be complete without showing at least one of the stamps portraying her daughter Irène and son-in-law Frédéric Joliot-Curie, who were jointly awarded the Nobel Prize in Chemistry in 1935 for their discovery of artificial radioactivity [19]. Now that the end of the IYC is quickly approaching, let's hope that the Curie family continues to be a source of admiration and inspiration for many generations to come.

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