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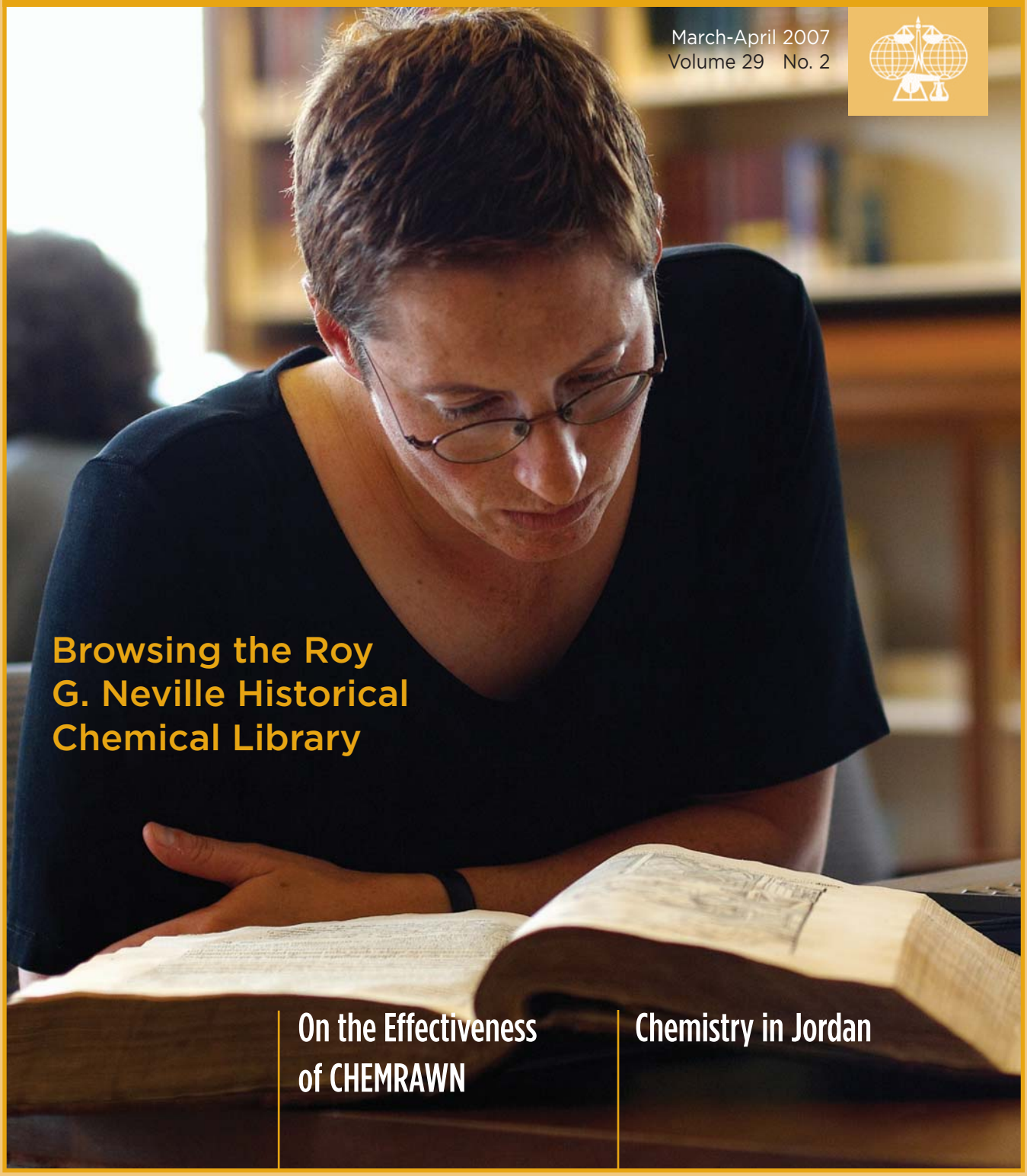

Browsing the Roy G. Neville Historical Chemical Library

On the Effectiveness of CHEMRAWN

Chemistry in Jordan

CHEMISTRY International

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

www.iupac.org/publications/ci

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From the Editor

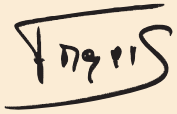
Treat yourself and read *A Whole New Mind** by Daniel Pink. Add here and there the "*chem*" word that applies best, such as chemists, chemistry, or chemical, and the book provides the basic ideas and arguments that should allow chemists to successfully transition from the Information Age to the Conceptual Age.

As Pink puts it, the Information Age featured an economy and society built on logical, linear, computer-like capabilities, while the Conceptual Age that is rising in its place is built on inventive, empathic, and big-picture capabilities. Throughout his book, Pink uses the simplified analogy of how our brain functions: our left hemisphere is the more logical, sequential, and rational, while the right is more simultaneous and context driven. Pink argues that the era of "left brain" dominance, and the Information Age that it engendered, are giving way to a new world in which "right brain" qualities of inventiveness, empathy, and meaning predominate. This evolution into the Conceptual Age will force everyone to reconsider what they do and how.

So, what does that mean for scientists and chemists? If Pink is right and the future belongs to creators and meaning makers, then the future belongs to chemists indeed. While (most) chemists are logical and analytical, their playground is such that they have to be very inventive as well. Chemists belong in the same category as artists, inventors, designers, storytellers, caregivers, and big-pictures thinkers.

While orbiting around the world of IUPAC, I can think of one particular committee that fits this very portrait of chemists working in a Conceptual Age: CHEMRAWN, the committee on "CHEMical Research Applied to World Needs." Contrary to other groups, CHEMRAWN projects do not share a commonality in term of chemistry discipline and specialty, but instead are goal oriented. The objective of CHEMRAWN is to foster new ideas to provide solutions to real problems. On page 4, John Malin, current chairman of CHEMRAWN, presents a short history and an example of what CHEMRAWN can be and can do. From world food supplies to sustainable agriculture, from sources of organic raw materials to greenhouse gases, from innovation in chemical industry to education, these are the sorts of topics CHEMRAWN has explored or is exploring.

There are challenges for every chemist, and in line with Pink's argument, the challenges of the Conceptual Age might very well afford rich rewards for those involved in finding solutions.



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**A Whole New Mind—Moving from the Information Age to the Conceptual Age*, Daniel H. Pink, 2005, Riverhead Books, New York, 2005.

Cover: *Every year, the Chemical Heritage Foundation (Philadelphia, Pennsylvania, USA) welcomes scholars and fellows to explore the numerous archives and book collections of its library. Pictured is Allison B. Kavey of City University of New York John Jay College of Criminal Justice, reviewing a rare book from the Roy G. Neville Historical Chemical Library.* *See feature on page 10.* Photo credit: Douglas A. Lockard.

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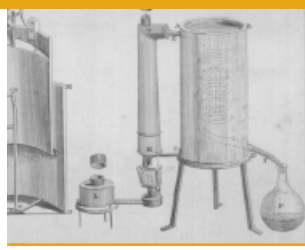

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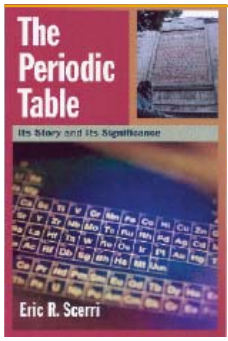


Torino—*Passion Lives Here*

by Leiv Sydnes, Giuseppe Della Gatta, and Franco De Angelis

Just about a year ago, the city of Torino in northern Italy was energized by hosting the Olympic Winter Games. The official motto of the games was "passion lives here." This coming August, Torino will host the 41st IUPAC World Chemistry Congress. On behalf of the organizers, we plan to show that chemistry is also one of our passions. We are therefore pleased to invite chemists from all over the world to attend this unique scientific event—to be held 5–11 August 2007—which constitutes one of the major international conferences in chemistry.

Column authors (L to R) Franco De Angelis, Leiv Sydnes, and Giuseppe Della Gatta.

Under the theme "Chemistry Protecting Health, Natural Environment and Cultural Heritage," the congress will address fundamental aspects of the sustainable chemistry endeavors of our age. Through plenary lectures, other oral presentations, poster sessions, workshops, symposia, and even a play, the whole Congress program will illustrate how important chemistry is when we are facing the most pressing challenge of our times, namely how to achieve a sustainable future. Here, sustainability is used in its widest sense; it is applied not only to the environmental situation, but also to global human health and social issues, such as infant mortality, which is still a major problem. Moreover, the Congress will stress the role of chemistry in uncovering and preserving our cultural heritage and better understanding the cultural roots of our civilizations. The Congress will devote at least one full session to each of these themes, even though all branches of chemistry will be covered by the program, which includes 10 sessions, some 30 workshops, and 2 satellite symposia.

Several of the Congress themes are intimately connected with the ethics of science. This is reflected in the opening plenary lecture by Roald Hoffmann, Nobel laureate 1981, "Science and Ethics: A Marriage of Necessity and Choice for this Millennium." The other plenary lectures will be delivered by Vincenzo Balzani (University of Bologna, Italy), "Molecular Devices and Machines"; Akira Fujishima (Kanagawa Academy of Science and Technology, Japan), "The Increasing Contribution of Photocatalysis to Comfort and Safety in the Urban Environment"; Robert Huber, Nobel laureate 1988 (Max-Planck-Institut für Biochemie, Germany), "Proteins and their Structures for Basic Science and Application in Medicine"; Jan Wouters, president of the International Council of Museums—Committee for Conservation (Royal Institute for Cultural Heritage, Brussels, Belgium), "Reflections on the Position of Chemistry in Multidisciplinary Approaches, Aiming at Protecting Cultural Heritage"; and Kurt Wüthrich, Nobel laureate 2002 (ETH, Zürich, Switzerland), "Protein Structure Biology Using NMR—at the Interface of Chemistry and Biology."

The sessions of the congress are as follows:

- Chemistry Protecting Natural Environment
- Chemistry Protecting Health
- Chemistry Protecting Cultural Heritage
- Materials Chemistry and Nanotechnologies
- Theoretical Chemistry and Computer Chemistry
- Inorganic Chemistry
- Analytical Chemistry
- Organic Chemistry
- Biological and Biophysical Chemistry
- Advances in Chemical Education
- Joint Session Symposium: CHEM-BIO-TECH2007

In addition, the Congress program comprises the presentation of *Should've*, the new play written by Roald Hoffmann about the social responsibility of scientists and artists, and also about three people struggling with the transforming power of death.

It is worth noting that IUPAC and Italy have a long-standing relationship. Italy was part of the original group of nations, together with Belgium, France, UK, and the USA, that decided in 1919 to found IUPAC. In fact, the Union's first General Assembly was held in Rome in June 1920. The Italian "Chemical National Council" was established at that time to be the contact with IUPAC; the president was Emanuele Paternò,

the famous chemist and successor to Stanislao Cannizzaro. Pictures of that historic 1920 meeting, taken at the Accademia dei Lincei and the Hotel Excelsior in Rome and during visits to major Italian chemical factories, are still in their original frames on the walls of the office of the president of the Italian Chemical Society (SCI) in Rome.

Two more general assemblies were held in Italy. The 13th IUPAC General Assembly was again held in Rome in 1938 together with the 10th IUPAC Congress. The 25th General Assembly took place at Cortina d'Ampezzo, in the Dolomites, in 1969.

Following the custom established in Geneva in 1997, this year's General Assembly will be held 4–12 August concurrently with the Congress. The General Assembly is the occasion for meetings of the statutory bodies of the Union, specifically of the Council, Bureau, division committees, and standing committees. The General Assembly will take place in facilities of the Università di Torino and the Politecnico di Torino, located adjacent to the Lingotto Complex.

The Scientific Programme Committee (SPC) of the Congress is chaired by Giuseppe Della Gatta and Francesco De Angelis, president of SCI, and has all the Italian session chairs as members. The cooperation between the Italian chemical community and IUPAC in organizing the Congress is reflected in the involvement of representatives from the IUPAC divisions in developing the session programs and by the participation of Leiv K. Sydnes, past president of IUPAC and chair of the Congress' International Advisory Board.

The SCI's contributions to the organization of the Congress are substantial and strategic. All the Italian chairs of the sessions are presidents of SCI divisions, who provide vast and authoritative experience in their own scientific fields. Each session will include presentations by invited speakers who will deliver keynote lectures, and other oral contributions to be selected on the basis of submitted abstracts.

The Congress will be held at the Lingotto Conference Centre, a great modern structure designed especially for conventions. Formerly a FIAT factory, built in 1923, the center's facilities have been completely restructured by the renowned architect Renzo Piano to become an advanced multifunctional complex. The auditorium has seats for about 2 000 people; in addition there are many conference and meeting halls and rooms that can host audiences of various sizes. The conference area of Lingotto is served by a Wi-Fi system. And a number of restaurants of different classes are an integrated part of the premises.

Rooms have been reserved in the hotels of the Lingotto Conference Centre as well as in the major downtown Torino hotels. In order to support the participation of chemists from every country, organizers are offering 1 200 low-cost accommodations in the university residences. Furthermore, to encourage young chemists to participate, the organizers have established two different programs, both offering travel assistance. About 50 awards will be available to qualified candidates under 40, which will cover some of the registration and travel costs.

In addition to the traditional social events included in the Congress program, such as the Congress banquet, several excursions and visits have been arranged for Wednesday afternoon of 8 August. Other one-day excursions and half-day visits will be planned for accompanying persons and participants. Pre-Congress and post-Congress tours and visits will also be organized.

An exhibition featuring scientific instruments and equipment from leading manufacturers, books, and journals will be held during the conference.

It is a great pleasure to welcome you to Torino for the 41st IUPAC World Chemistry Congress. We look forward to seeing you there and sharing our passion for chemistry!

Leiv K. Sydnes <Leiv.Sydnes@kj.uib.no>, IUPAC past president, chairs the Congress International Advisory Board; Giuseppe Della Gatta <giuseppe.dellagatta@unito.it> chair of the Scientific Programme Committee; and Francesco De Angelis <deangeli@univaq.it>, president of the Italian Chemical Society, co-chairs the Scientific Programme Committee and the International Advisory Board.

CHemical Research Applied to World Needs

*"In 1865, in Cambridge, England, the 18-year-old William Perkin undertook an independent research study that resulted in the discovery of aniline dyes. Against the advice of his teacher, Professor Hoffman, Perkin applied his research to world needs—and launched the coal-tar-dye industry. Therefore, in reality, the concept of CHEMRAWN, "**CH**emical **R**esearch **A**pplied to **W**orld **N**eeds," is not new. What is new is the increasingly complex, interdependent world, with a burgeoning population, limited resources, rising middle-class expectations, vastly improved communications, the possibility of nuclear war, and the new specter of global terrorism. These and other major world problems are not unique to chemists, but afflict the whole of humankind. Solutions to many of the world's material, economic, social, and even political problems depend upon our ability to transform basic elements of raw materials in order to increase food production, provide alternative sources of energy and chemical feedstocks, deliver new drugs for the alleviation of human disease, supply less costly and corrosion-free substances for building and fabrication, and innovate new materials for communications. These are the domain of chemistry. Therefore, chemists have a special and vital role to play. Stated simply, chemistry is a central discipline that interacts with virtually every aspect of human endeavor. Indeed, chemistry is the wellspring of life itself. Little wonder then, that chemists should be called upon to address the world's most pressing needs."*

Bryant Rossiter,
first chair of IUPAC's CHEMRAWN Committee

On the Effectiveness of CHEMRAWN

by John M. Malin

The 28-year history of CHEMRAWN has produced 14 full-fledged CHEMRAWN conferences. The meetings have varied in subject, location, size, and budget, but they have all addressed a single goal—to catalyze the use of chemistry and related sciences and engineering to meet world needs. This article describes how the CHEMRAWN process has fostered new ideas and supported solutions to world problems.

In the introduction above and in the following paragraphs, Bryant Rossiter, the first chair of IUPAC's CHEMRAWN committee, describes [extracted from an unpublished retrospective drafted in 1994] the origins and goals of the CHEMRAWN conferences.

"In 1973, the IUPAC conference in Munich included on its agenda a session on 'opportunities for international cooperation through IUPAC.' The suggestion proposed a new mechanism in IUPAC, a mechanism whereby member nations could aid in identifying and solving important chemistry problems that have a direct impact on world needs.

"The general idea was unanimously approved and the U.S. delegation, which had begun the discussion, was asked to define and elaborate on the proposal. The U.S. national committee, of which I [Rossiter] was privileged to be a member, subsequently drafted a statement under the heading 'Chemical Research Applied to World Needs.' Like so many other long titles, this one became known by its acronym: CHEMRAWN.

The CHEMRAWN statement, designed to reflect a set of purposes around which various activities might be organized, proposes:

A. To identify human needs amenable to solution through chemistry, with particular attention to those areas of global or multinational interest.

B. To serve as an international body and forum for the gathering, discussion, advancement, and dissemination of chemical knowledge deemed useful for the improvement of humankind and our environment.

C. To serve as an international, nongovernmental source of advice for the benefit of governments and international agencies with respect to chemistry and its application to human needs."

This statement is still used today to describe the Terms of Reference of the CHEMRAWN Committee. Rossiter explains that . . .

"To achieve these ends, it was proposed that CHEMRAWN activities should:

1. *Provide scientific and organizational leadership for the purpose of identifying chemically related needs, opportunities, and priorities on an international and worldwide scale.*
2. *Organize, in cooperation with established scientific bodies and international conferences, forums, workshops, symposia, collaborative studies, etc., for the gathering, presentation, discussion, evaluation, publication, and dissemination of information relating to chemistry and the needs of humankind in our environment.*
3. *Help provide an understanding of trends, consequences, alternatives, and resources relating to raw materials and supplies of chemical intermediates.*
4. *Act as a focal point, clearinghouse, and coordinating body for individual conferences relating to chemical research and world needs.*
5. *As a part of the International Council for Science, serve as an advisory body to the United Nations and its member nations and agencies—with special attention to developing nations.*
6. *Develop the means to assist public understanding of chemistry and its relationship to the world economy and the betterment of humankind."*

It is important to realize that CHEMRAWN conferences are designed to identify and focus attention on world needs and to recommend actions that should be taken by the global scientific community. Normally, a CHEMRAWN Future Actions Committee has been formed at each conference to promulgate the conference's recommendations and to encourage appropriate sectors of the community to carry them forward. However, it was never the intent of CHEMRAWN to lock academia, industry, and government into any particular structure to solve world problems, or to follow up to ensure that they did.

A study of the recommendations developed by CHEMRAWN conferences and their Future Actions Committees leads to the conclusion that most are being carried out, or have been carried out somewhere on the globe. Many CHEMRAWN recommendations have informed the science policy of nations and the actions of engineers and scientists. However, it is difficult to take credit for specific CHEMRAWN contributions to society because so many people and factors have been involved. One hopes and expects that the world needs under discussion will always be addressed by a plethora of individuals, organizations, and governments. CHEMRAWN contributes especially by pointing the way to solutions and by establishing consensus. That it is rarely the only positive influence evidences the strength and synergy of the process.

The value of CHEMRAWN conferences to societies and governments can be judged on the type of leaders it has been able to attract to its cause. World-class leaders are very busy, have reputations to protect, careers to advance, and cannot afford to waste time and effort on activities that do not pay high dividends to themselves and the institutions they represent. Past conferences have attracted national presidents, eight Nobel laureates, presidents of major universities, and senior industrial scientists and managers. In addition, CHEMRAWN events have raised significant resources: some USD 3 000 000 in support costs and the collaboration of hundreds of scientists.

Important CHEMRAWN results have often been imbedded in some aspect of the bigger picture and were not widely recognized. For example, Alan Bromley, science adviser to U.S. President George H.W. Bush, informed Rossiter that the *Perspectives and Recommendations* from CHEMRAWN VII—Chemistry of the Atmosphere: Its Impact on Global Change, represented a very important input to the U.S. government, resulting in policy changes regarding global warming and atmospheric change. This policy change was aided by the fact that Representative Ron Packard, a member of the U.S. House of Representatives Ways and Means Committee, ensured that every member of the House and Senate received a copy of the CHEMRAWN VII *Perspectives and Recommendations*.

In order to understand fully the results of CHEMRAWN, it is necessary to examine the conferences themselves, to remain mindful of each event's epoch and venue, and to consider the state of the particular chemical discipline and its needs. Following is a summary of the first CHEMRAWN conference. Summaries of all the other CHEMRAWN conferences

(see list in box) can be found online at <www.iupac.org/standing/chemrawn/history.html>.

CHEMRAWN I: Future Sources of Organic Raw Materials

IUPAC's first CHEMRAWN event was the "World Conference on Future Sources of Organic Raw Materials" held 10–13 July 1978 in Toronto, Canada. The conference was the first significant gathering of major international scientists and decision-makers from industry, government, and academia to address a major problem in a concerted way. It was held shortly after the OPEC oil embargo during a frantic effort to find a substitute for oil. Solar, wind, geothermal, biomass, coal, and shale oil deposits were being highly touted, with an accompanying cry for money to fund the research.

Approximately 800 scientists from 48 countries attended. The organizing committee and attendees included not only internationally recognized technical experts, but also board chairpersons, presidents, vice presidents, and research directors from industry; world banking leaders; advisers to top government officials; and other high-ranking influential people. The purpose of the conference was to seek solutions to the problem of increasing world consumption of organic materials—petroleum and biomass. Particular attention was given to the needs of developing nations. Leaders from those nations were instrumental in many stages of the conference planning and were prominently featured in the plenary, technical, and summary sessions.

Max Tischler (USA) chaired the program committee. The opening plenary session was organized under the chairmanship of Glenn T. Seaborg of the University of California at Berkeley, recipient of the Nobel Prize for chemistry in 1951. The final plenary session was organized under the guidance of William O. Baker, president of Bell Telephone Laboratories.

The program also included eminent personalities, such as the chairman of the Board of E.I. DuPont de Nemours & Company; the assistant director general of the United Nations Forestry Department; a counselor to the prime minister of Egypt; the chairman of the Board, Bayer A.G; the ambassador of Brazil to the UK; the president of the University of Tokyo; a representative of the French Scientific Mission from Washington, D.C.; the chief scientist of the UK Department of Industry; and the vice-president of Exxon Chemical.

Outcomes and Recommendations

The major conclusion of the conference was that there is no substitute for oil and we should stop pretending

14 CHEMRAWN Conferences Since 1978

I	Toronto, Canada (1978) Future Sources of Organic Raw Materials
II	Manila, Philippines (1982) Chemistry and World Food Supplies: The New Frontiers
III	The Hague, the Netherlands (1984) Resources Material Conversion
IV	Keystone, Colorado, USA (1985) Modern Chemistry and Chemical Technology Applied to the Ocean and its Resources
V	Heidelberg, Germany (1986) Current and Future Contributions of Chemistry to Health
VI	Tokyo, Japan (1987) Advanced Materials for Innovations in Energy, Transportation, and Communications
VII	Baltimore, Maryland, USA (1991) The Chemistry of the Atmosphere: Its Impact of Global Change
VIII	Moscow, Russia (1992) Chemistry and Sustainable Development
IX	Seoul, Korea (1996) Advanced Materials and Sustainable Development
X	Budapest, Hungary; Washington, DC, USA; Honolulu, Hawaii; and Brisbane, Australia (1999–2000) Chemical Education in Global Development
XI	Montevideo, Uruguay (1998) Latin American Symposium on Environmental Analytical Chemistry
XIV	Boulder, Colorado, USA (2001) Toward Environmentally Benign Processes and Products
XV	Paris, France (2004) Chemistry for Water
XVI	Ottawa, Canada (2003) Innovation in the Chemical Industry
Forthcoming Conferences	
XII	Stellenbosh, South Africa (2007) Chemistry, Sustainable Agriculture and Human Well Being in Africa
XVII	Kingston, Ontario, Canada (2007) Greenhouse Gas Mitigation

that expending massive amounts of money will solve immediate problems. In the short term, the conference recommended, we should promote conservation, exploit untapped oil and gas reserves, begin research on alternative sources of organic raw materials, and pay close attention to the economics necessary to make the alternatives viable in a modern society. The conference adopted the following recommendations:

1. An international group should be formed to assess the organic supply problem in a continuing way.
2. An assembly of high-level government science advisers should be formed. The group should consider the problem of organic supply in terms of governmental actions, determine priorities for budgeting research and development, and provide socio-technical plans for inevitable changes in lifestyle.
3. Industrial research and development bodies must address the problem. Industrial organizations should form a group to monitor and assess technical progress.
4. The leading scientific societies should form a group to ensure that the basic scientific issues are identified, publicized, and presented at scientific gatherings.
5. A task force should be organized, including media experts, to publicize the prospects and consequences of shortages of organic compounds.

All members of the Organizing and Future Action Committees were asked to disseminate the results among their respective institutions and countries. As a direct result of CHEMRAWN I, Eastman Kodak and several other companies started research programs in photovoltaics. Bryant Rossiter, CHEMRAWN chair, was asked by Calvin Rampton, the governor of Utah, to join a four-person multidisciplinary panel to help the State of Utah develop its coal, oil shale, and geothermal resources while avoiding the environmental damages seen in other states. James F. Mathis, senior vice president of Exxon, stated that Exxon revamped its approach to alternative sources of energy as a result of CHEMRAWN I. The Philippine government dropped a project promoting coconut oil as a substitute for diesel fuel because it failed to meet economic requirements, although it met technical requirements superbly. Baker, chairman of the Future Actions Committee, presented the results of CHEMRAWN I to the U.S. National Research Council. William Schneider, organizing chairman, presented the same to the National Research Council of Canada, of which he was president. T. Mukaibo did this in Japan and the pattern was followed by many other institutions and people throughout the world.

There were many side benefits to CHEMRAWN I. The CHEMRAWN concept was judged to be a viable forum for addressing world needs. Thomas F. Malone, foreign secretary of the U.S. National Academy of Sciences and treasurer of the International Council of Scientific Unions, wrote to Colby Chandler, president of Eastman Kodak, that "CHEMRAWN is part of one of the more important processes of our generation—in addressing directly human needs amenable to solution through chemistry." The ability of CHEMRAWN I to draw the very top leaders from all segments of the industrial, academic, and governmental enterprises captured worldwide attention, and in many ways would redirect some of the major IUPAC programs as well as other international programs. CHEMRAWN I demonstrated that conferences devoted to world needs could be financial as well as scientific and technological successes.

CHEMRAWN Chairs

1978–1987	Bryant Rossiter
1987–1991	John Meurig Thomas
1991–1997	Alan Hayes
1997–2003	Parry Norling
2004–2007	John Malin

In light of more recent petroleum shortages, CHEMRAWN I was prescient in detailing the importance of conservation of petroleum resources, the need for utilization of biomass, and the dearth of alternate energy sources. It was noted particularly that the chemical industry is primarily petroleum based, and that increases in energy prices lead directly to increasing costs for chemical feedstocks.

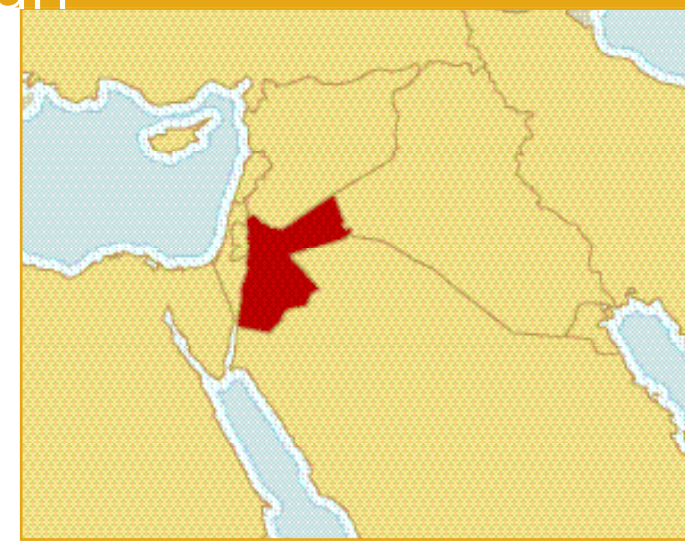
The early history of CHEMRAWN is described in *History of IUPAC 1919–1987* (Fennell, 1994); and *History of IUPAC 1988–1999* (Brown, 2001). Coverage of CHEMRAWN I appeared in *Chemical and Engineering News* (Krieger 1978; pp 28–31, 24 July) and in a *Perspectives and Recommendations* volume (St-Pierre, 1978; Multiscience Publications Limited, Montreal ISBN 0-919868-06-01).

www.iupac.org/standing/chemrawn.html

John M. Malin <jmalin023@comcast.net> is the chair of the CHEMRAWN Committee; he has been involved with the committee since 1998.

Chemistry in Jordan

Following the addition in 2005 of the Jordanian Chemical Society (JCS) as a National Adhering Organization to IUPAC, CI *invited the president of the JCS to present the state of chemistry in Jordan. As the JCS is preparing to hold a major international conference this coming June in Petra, the timing seemed most opportune for* CI *readers to learn more.*



by Sultan Abu-Orabi

The population of Jordan, a small country in the Middle East, has increased rapidly in the last half-century, growing from about 250 000 in 1930 to 6 million in 2005. The explosive population growth was due to an influx of Palestinians after the establishment of the state of Israel in 1948 and more recently the immigration of people from neighboring countries due to the Gulf and Iraq Wars. With a total area of 89 000-square kilometers, Jordan has scarce sources of water and no oil.

The development of Jordan's educational system can only be described as dramatic. Starting from almost nothing in the early 1920s, Jordan has forged a comprehensive, high-quality system to develop the human capital of its citizens. As a result, the rapid spread of facilities enabled citizens in poor and remote areas to gain access to education. The University of Jordan, located west of Amman, was established with 260 students and 15 faculty members in 1962. Consequently, the first chemistry department started at the University of Jordan with about 20 students in 1965.

In Jordan, chemistry is thought of as the core of the basic fields of science.

Currently, access to basic education in Jordan is emphasized in all the country's development plans. The government has, as a matter of policy, provided a school to every village and community with 10 or more school-age children. In 2006, there were 2 787 government schools, 1 493 private schools, 48 community colleges, and 28 state and private universities. Almost half of these universities award Bachelors of Science and Masters of Science degrees in chemistry. Only the University of Jordan awards Ph.D.s in chemistry. In Jordan, chemistry is thought of as the core of the basic fields of science. Therefore, we have more than 1 000 graduates in chemistry yearly.

Arab Potash Company, Safi Jordan. *Photo from Aalborg Engineering A/S, Denmark.*

It is estimated that more than 500 Jordanians have Ph.D.s in chemistry, over a thousand have Masters degrees, and more than 5 000 have bachelor's degrees. Fortunately, many of these individuals are able to secure jobs in academia or industry in Jordan.

In fact, Jordan has invested billions of dollars in pharmaceutical and chemical factories. More than 20 pharmaceutical companies produce drugs and medical products, approximately 80 percent of which are exported to U.S., Canadian, European, Asian, and African markets. Additionally, Jordan exports phosphate, potash, and many fertilizing products all over the world. One of the largest operations is the Arab Potash Company, which extracts many products from the Dead Sea, including potash.

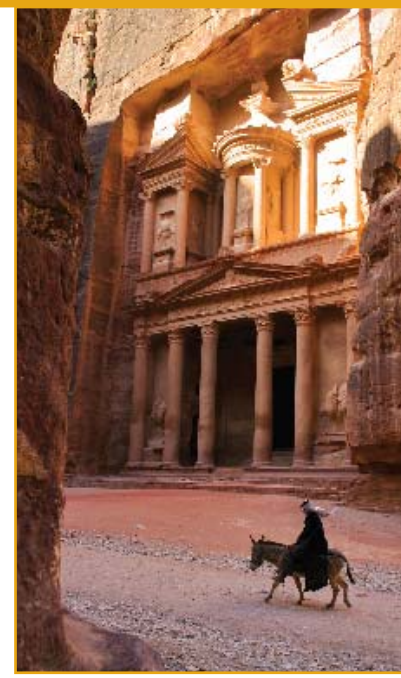
Established in 1976, the Jordanian Chemical Society is the umbrella organization for all chemists in Jordan. This society has more than 500 active members from universities, chemical companies, and high schools. The Jordanian Chemical Society is among the founders of the Arab Union of Chemists, which includes 15 Arab countries. In addition, it is an active member of the Federation of Asian Chemical Societies.

In Jordan, we are proud of the progress our chemistry society has accomplished during the last five years. Our policy has been

to maintain a rate of holding one conference per year. The results of the studies and research papers that are presented at these conferences are invaluable to the chemical industry in Jordan and abroad. In 2003, 200 participants attended the 12th Arab Chemical Conference held in Amman. In addition, I was honored to be the president of the International Jordanian Chemical Conference held at Yarmouk University in 2002, in which more than 300 chemists from 40 countries participated.

The Jordanian Chemical Society, in partnership with Tafila Technical University, has been organizing the International Petra Conference in Chemistry to be held in June 2007. Petra, the conference locale, is a well-known historical city in Jordan, located about 220 kilometers south of Amman. More than 300 participants are expected from all over the world. See page 30 or <www.ttu.edu.jo/picc> for more information.

Additionally, the society has been working with the Ministry of Higher Education and Scientific Research in Jordan to launch the *Jordan Journal of Chemistry*, which is the first international journal for publishing chemistry papers and articles in Jordan; see <www.jjc.yu.edu.jo>.



The "Treasury" at Petra, Jordan, site of an international chemistry conference to be held in June 2007.

The Jordanian Chemical Society has participated in many international conferences, scientific meetings, and events. It played an influential role in the last Malta I and Malta II meetings: Frontiers of Chemical Sciences Research and Education in the Middle East, which were organized by the American Chemical Society, IUPAC, UK's Royal Society of Chemistry, and the German Chemical Society. (see May-June 2004 *CI*, p. 7 and Mar-Apr 2006 *CI*, p. 6)

Many international institutions have acknowledged members of our society; some of whom have received awards such as the Alexander Von Humboldt, DAAD Fellowship (Deutscher Akademischer Austausch Dienst), Fulbright Scholarship, and Shuman Award.

We look forward to further collaboration of our society and our associates with the IUPAC organization.

www.jorchem.com

Professor Sultan Abu-Orabi <abuorabi@excite.com> has been president of the JCS since 2001 and is also president of Tafila Technical University.

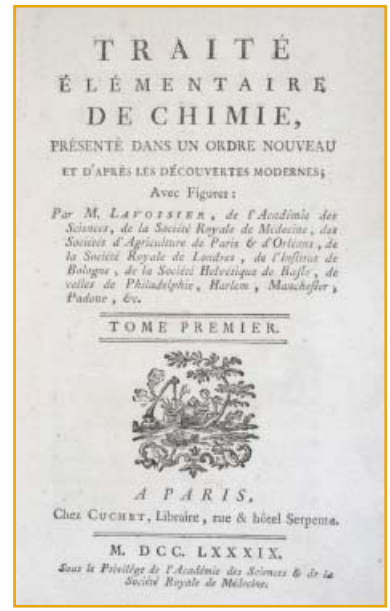
Before "Modern" Chemistry

A Stroll inside the French Books from the Roy G. Neville Historical Chemical Library

by Laure Joumel

In France, the history of chemistry is an integral part of the university science curriculum. Students learn about the historical figures in the development of chemistry and the books they wrote, which became cornerstones of science. Some of the first and most beautiful editions of these works are conserved in a wonderful library of the Chemical Heritage Foundation in Philadelphia, Pennsylvania, USA. The collection of the Roy G. Neville Historical Chemical Library, which is carefully conserved and open to the public, spans the late 15th century to the early 20th century and includes many of the most important works in the history of chemical science from that period. (Neville, who founded the firm Engineering and Technical Consultants, is a passionate bibliophile.) The Neville Collection is part of the Othmer Library of Chemical History, one of the richest libraries of this specialty in the world, with roughly 40 000 titles. (Donald F. Othmer was a founding editor of the *Kirk-Othmer Encyclopedia of Chemical Technology*).

The Neville Library offers a remarkable selection of French-language books, including some rare and precious editions that detail the origin and development of chemistry before Lavoisier's "revolution." The library contains editions not only of Lavoisier and his contemporaries, including Louis Bernard Guyton de Morveau, Claude Louis Berthollet, Antoine François de Fourcroy, Pierre Joseph Macquert, and Nicolas Lemery, but also his predecessors who marked the transition from alchemy to early modern science. And, of course, since the "revolution" was not confined to France, the collection also features works from the rest of continental Europe.


TRAITÉ
ÉLÉMENTAIRE
DE CHIMIE,
PRÉSENTÉ DANS UN ORDRE NOUVEAU
ET D'APRÈS LES DÉCOUVERTES MODERNES;
Avec Figures:
Par M. LAVOISIER, de l'Académie des Sciences, de la Société Royale de Médecine, des Sociétés d'Agriculture de Paris & d'Orléans, de la Société Royale de Londres, de l'Institut de Bologne, de la Société Helvétique de Bâle, de celles de Philadelphie, Harlem, Manchester, Padoue, &c.
TOME PREMIER.
A PARIS,
Chez CUCHET, Libraire, rue & hôtel Serpente.
M. DCC. LXXXIX.

Cover of the* Traité Elémentaire de Chimie *(Lavoisier, 1789). *Courtesy of the Roy G. Neville Historical Chemical Library, Chemical Heritage Foundation.*

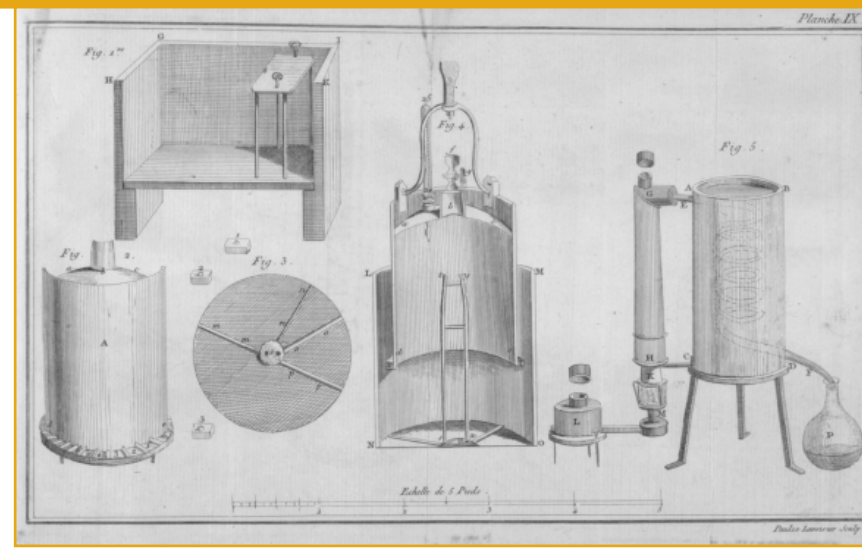
From a Philosophy to a Science

One of the earliest French works in the collection is *Discours admirables* (Paris, 1580), by the great potter. Bernard Palissy (c.1510–1589/90) spent decades studying chemistry and other sciences to perfect his porcelain-making techniques. Palissy criticized contemporary alchemists who sought chemical knowledge in hopes of generating wealth through transmutation rather than applying their knowledge to practical ends, writing, "Those who want to make gold and silver, their stinginess can not be hidden; their goals are at the same level as the lustful and lazy." (Translations in this article are my own.)

Palissy would undoubtedly have been more satisfied with the practical importance of a 1697 work by Nicolas Lémery (1645–1715), an apothecary from Rouen, Normandy. In *Pharmacopée universelle*, a book that became a reference tool for generations of chemists (CHF owns a copy of the second edition, Paris, 1725), Lémery explained, "I have begun a task that is greatly desired by many people and that no one, as far as I know, has ever worked on: a universal pharmacopoeia, in which I collect all the descriptions of old and modern pharmacy." Lémery also wrote *Cours de chymie* (Paris, 1675), a standard reference in the teaching of early modern chemistry that had an influence well beyond France's borders. CHF owns French, English, Italian, and German versions.

At the end of the 17th century, a British critic of contemporary chemistry, Robert Boyle, argued that a more orderly approach to chemical theories and practice was required. Conserved in a brown-red box in the CHF library, its cover cracked with age, is a copy of the first edition of Boyles's *The Sceptical Chemist* (London, 1661). The preface to this book reveals the author's thoughts: "Chymical Notion about matters philosophical are taken for granted and employed and so adopted by very eminent writers both Naturalists and Physitians. Now this I fear may prove somewhat prejudicial to the advancement of solid philosophy: For though I am a great Lover of Chymical experiments . . . for ought I can hithero discern, there are a thousand phenomena in Nature, besides

a multitude of Accident relating to the humane body, will scarcely be clearly and satisfactorily made out by them that confine themselves to deduce things from Salt, Sulfur, and Mercury." The book found a wide audience in several languages and countries; CHF's holdings include editions published in the Netherlands (1668) and Switzerland (1680).



An illustration from* Traité Elémentaire de Chimie, *engraved by Madame Lavoisier. *Courtesy of the Roy G. Neville Historical Chemical Library, Chemical Heritage Foundation.*

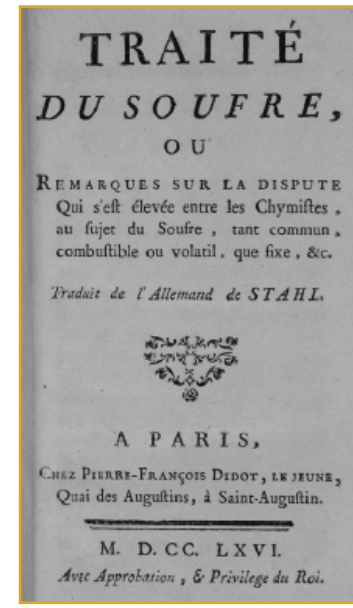
A New Step

An early attempt to provide theoretical grounding to early modern chemistry was Georg Ernst Stahl's (1660–1734) theory of phlogiston. According to Stahl, phlogiston (derived from "flame") is the engine of combustion. He saw fire—one of Aristotle's four elements—as a component of all matter. When matter burnt, it lost the fire that was inside it: phlogiston. Conversely, when matter was heated, it gained some phlogiston. The principle was seductive because it provided a harmonious answer to two of chemistry's most perplexing questions, combustion and reduction.

Pierre Joseph Macquer (1718–1784) was one of the key exponents of the theory of phlogiston in France. In his *Dictionnaire de chymie* (Paris, 1766), Macquer (1718–1784) praises the key figure in the development of this theory: "We have to recognize the magnificent and deserved titles of the famous [Georg Ernst] Stahl, brilliant, an active imagination, and animated by wisdom." The presence in the Neville Library of French-language copies of several of Stahl's most famous books testifies to his influence on French chemists before Lavoisier.

The cornerstone of modern chemistry was built during the second half of the 18th century. Scottish chemist Joseph Black (1728–1799) isolated carbon dioxide (which he called "fixed air"), which marked the beginning of the end of phlogiston. Henry Cavendish (British, 1731–1830) discovered the synthesis of water and understood that it comes from two different gases: "ignitable (inflammable) air" (H_2) and "dephlogistic air" (O_2)—indeed before Lavoisier. Joseph Priestley (1733–1804), the last great holdout against Lavoisier's "new chemistry," was also well-read in France. In his *Experiments and Observations on Different Kinds of Air* (1775), Priestley reflected, "All the species of Air that seem for me different from each other are fixed Air, acid Air, and alkaline Air because these and another called phlogiston, that I couldn't isolate and by now has never been proved in any shape, are all the species of Air that I know." The Neville library holds (besides several British editions) two French editions of his *Experiments and Observations on Different Kinds of Air* (1775).

Another important precursor to Lavoisier's theories was the work of the Swede Carl Wilhem Scheele (1742–1786), who discovered the "acid" muriatic dephlogiston (which would later be called chlorine) and the "fire" Air (which would be called oxygen). In *Supplément au Traité de l'Air et du Feu* (Paris, 1785), Scheele begins, "We know that we can't see our Air just as an elastic liquid because if you take off all the heterogen that belongs to it . . . we find that the Air is formed by two distinguished parts: one is called 'vicie Air' because it is dangerous and deadly, and the other is called 'pur Air' or 'fire air' because it is exactly the opposite and permits breath."


TRAITÉ
DU SOUFRE,
OU
REMARQUES SUR LA DISPUTE
Qui s'eſt élevée entre les Chymiſtes, au ſujet du Soufre, tant commun, combuſtible ou volatil, que fixe, &c.
Traduit de l'Allemand de STAHL.
A PARIS,
CHEZ PIERRE-FRANÇOIS DIDOT, LE JEUNE, Quai des Auguſtins, à Saint-Auguſtin.
M. D. CC. LXVI.
Avec Approbation, & Privilege du Roi.

Cover of the* Traité du Soufre *(Stahl, 1766). *Courtesy of the Roy G. Neville Historical Chemical Library, Chemical Heritage Foundation.*

The Birth of Modern Chemistry

Priestley's isolation of oxygen and other gases and centuries of chemical experimentation by other pneumatic chemists set the ground for Lavoisier's pathbreaking work. CHF owns dozens of early French-language editions by Lavoisier and his followers, including a 1789 edition of his glorious *Traité élémentaire de chimie* which contains illustrations engraved by Madame Lavoisier. The inspiration behind Lavoisier's magnum opus lay in his work on a new, standardized chemical nomenclature: "As I was working on nomenclature, while I just wanted to perfect the language of chemistry, my book was changing in my hands . . . it became an elementary course of chemistry."

The Neville Library holds a first edition of the book that provided the foundation of our modern chemical language. The result of eight months of collaboration between its authors—Lavoisier, Guyton de Morveau, Berthollet, and Fourcroy—*Méthode de nomenclature chimique* (Paris, 1787) provides a step-by-step guide to the thinking that led to the new vocabulary: "We adopt the expression 'oxygen' . . . from the Greek oxnz, acid, and geinoma, generate." The theories and vocabulary espoused by Lavoisier were quickly adopted in his native land and elsewhere.

The books in the Neville Library by Lavoisier's predecessors, contemporaries, and followers—many of them translated into several languages—show the development and dissemination of the "new chemistry" and its nomenclature. It is from the knowledge contained in these texts that modern discoveries bloomed.

www.chemicalheritage.org/library/lib-neville.html

Laure Joumel <laurejoumel@gmail.com> reviewed the Roy G. Neville Collection at the Chemical Heritage Foundation (CHF), during a one-month stay in Philadelphia, Pennsylvania, USA, under a CHF-Travel Grant. Joumel is still based in Philadelphia, where she now works in the communication department of Arkema. She is also a freelance writer.

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

Stamps International

Moissan's Isolation of Fluorine

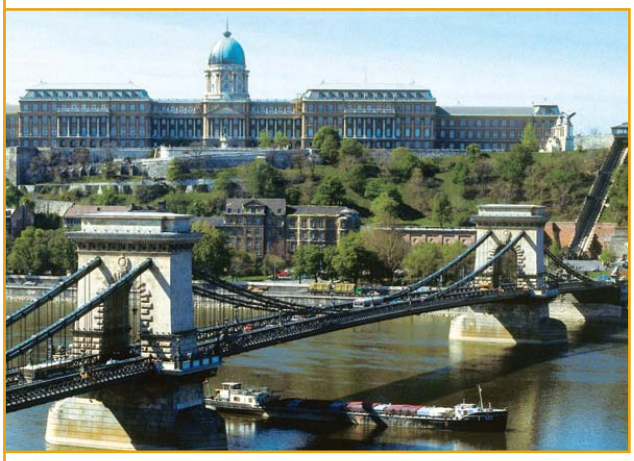
The French chemist Henri Moissan received the Nobel Prize for Chemistry in 1906 for his isolation and investigation of the element fluorine and for his introduction of the electric furnace in the preparation of metal carbides and other refractory materials. The competition to earn the favor from the members of the chemical section of the Royal Swedish Academy of Sciences was particularly tough that year: Moissan edged out by only one vote (5–4) no one less than Dmitri Mendeleev! Unfortunately, the famous Russian chemist never got another chance to win the coveted prize since he died of influenza on 2 February 1907, and Moissan himself passed away from acute appendicitis 18 days later, shortly after returning to Paris from his trip to Stockholm.

The synthesis of elemental fluorine in 1886 was no small feat and Moissan succeeded where many before him had failed. The key to the isolation of this most reactive of elements, *l'enfant terrible* of the periodic table, was to electrolize at -25 °C a solution of potassium hydrogen fluoride (KHF_2) in liquid anhydrous hydrogen fluoride. Special platinum–iridium electrodes and a platinum U-shaped vessel capped with fluorite (CaF_2) stoppers, not exactly run-of-the-mill equipment, were required to attain success. Moissan's electrolytic cell, illustrated on the two French stamps accompanying this note, is currently on display at the Moissan Museum in the School of Pharmacy, Université René Descartes—Paris 5. Interestingly, the stamp issued in 1986 to commemorate the 100th anniversary of the preparation of the mighty halogen, shown above, displays the incorrect (reverse) chemical equation (i.e., the reaction of fluorine with hydrogen to produce hydrogen fluoride)!

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

Chemists Gather in Budapest for the 1st European Chemistry Congress

From 27–31 August 2006 in Budapest, 2 348 chemists and molecular scientists from 57 countries took part in the 1st European Chemistry Congress, cosponsored by the Gesellschaft Deutscher Chemiker, the Royal Society of Chemistry, and the Société Française de Chimi. The event was organized by the European Association for Chemical and Molecular Sciences (EuCheMS), registered earlier this year, but previously known as the Federation of European Chemical Societies, which was founded in 1970. The new association comprises 50 member societies from 36 countries, and has about 150 000 members.



In the past, diverse national interests led to the proliferation of national chemical societies in Europe. EuCheMS was founded with the aim of joining efforts to promote chemistry—both inside and outside Europe—and to influence the EU government on the future development of the European Research Area. According to Congress Chairman Gabor Naray-Szabo, the congress aimed "to be a showcase for chemical sciences in Europe" by bringing together around 3 000 chemical and molecular scientists from around the world.

The meeting consisted of around 1 400 oral and poster presentations, covering a broad range of chemistry and molecular science topics. Five Nobel-laureates, Paul J. Crutzen, Jean-Marie Lehn, George A. Olah, Kurt Wüthrich, and Ahmed H. Zewail, gave 60-minute plenary lectures. In addition, 10 distinguished scientists presented keynote lectures, including Dieter Seebach who gave the EuCheMS lecture on the biomedical potential of beta-peptides.

Besides the four-day conference, various satellite activities were run in parallel, including the Environmental Chemistry Meeting, the First European Young Chemist Award Competition, and the launch of Molecular Frontiers, a global effort to promote the understanding and appreciation of molecular science in society.

www.euchems-budapest2006.hu

Javier Garcia Martinez Wins Silver Medal of the European Young Chemist Award

Javier Garcia Martinez, a young new member of the Inorganic Chemistry Division, was awarded the Silver Medal of the European Young Chemist Award during the 1st European Chemistry Conference, held in Budapest. Martinez was honored for his research on biomimetic nanomaterials. Of the 120 applicants for this first-time award, organized under the auspices of EuCheMS, 14 finalists were invited to give 20-minute lectures in the Plenary Hall in the presence of the award jury, which included Francesco De Angelis, Gabor Naray-Szabo, and Igor Tkatchenko.

www.euchems-budapest2006.hu

Observatory on Intellectual Property

At its meeting in October 2006, the Executive Board of the International Council for Science (ICSU) approved a preliminary proposal for ICSU to develop an Observatory on Intellectual Property (IP). IP policies have a major impact on science and access to scientific products, including data and information, and these policies are increasingly being developed at the international level in organizations such as the World International Property Organization. The scientific community does not currently have a concerted mechanism for monitoring and influencing these policies; the observatory would be designed to address this deficit.

www.icsu.org/1_icsuinscience/DATA_IPR_1.html

2006 CODATA Prize Awarded to John Rumble

The 2006 CODATA Prize was awarded to John Rumble, technical director for Information International Associates. Rumble received the prize in Beijing, China, on 22 October 2006. The prize is awarded biannually for outstanding achievement in scientific and technical data.

Rumble, former director of the Standard Reference Data Program at the National Institute of Standards and Technology (NIST), was honored for being "an innovator in the world of scientific and technical data." He was instrumental in extending data evaluation techniques to new disciplines, including engineering, materials, and biotechnology. Rumble has long been a leader in using advanced information technology for developing computerized databases, online data networks, and data exchange standards.

Rumble is an IUPAC Fellow and was instrumental in setting up and implementing the cooperation between NIST and IUPAC to make the IUPAC Solubility Data Series available online.

CODATA, the Committee on Data for Science and Technology, is an interdisciplinary committee of the International Council for Science.

Samsung Total Petrochemical Co., Ltd. Donates USD 25 000 to the IUPAC Polymer Division

Samsung Total Petrochemical Co., Ltd. of South Korea, of which Hong-Sik Ko is president, recently donated USD 25 000 to the IUPAC Polymer Division, of which Jung-Il Jin is president. The donation will be added to the Samsung Total Petrochemical Company Endowment fund that was originally created after a USD 125 000 donation from Samsung in 2003. The income from the fund is used by the Polymer Division to support excellent researchers and students in polymer science, especially by providing opportunities for younger researchers and students from economically disadvantaged countries to attend IUPAC-sponsored conferences. The fund is also used to support educational projects of the Polymer Division, with the intention of making them more accessible to researchers from economically disadvantaged countries.

www.iupac.org/news/archives/2007/Samsung-donation.html

Celebrating the Naming of Element 111

On 17 November 2006, a ceremony was held at the Gesellschaft für Schwerionenforschung (GSI) in Darmstadt, Germany, to celebrate the naming of element 111.

The name of the element, which was discovered at GSI, honors Wilhelm Conrad Röntgen, the discoverer of the Röntgen rays (X-rays) for which he received the first Nobel Prize in Physics. Federal Minister for Education and Research Annette Schavan was "Godmother" at the ceremony.

Element 111 was first detected in 1994 by an international research team led by Sigurd Hoffman. At that time three atoms of the new element were detected in experiments at the accelerator facility at GSI. Further experiments, both at the GSI and at RIKEN in Japan, produced more atoms of element 111, which confirmed the discovery.

IUPAC officially recognized element 111 and requested that GSI, as discoverer of the new element, propose a name. The name roentgenium, with the symbol Rg, was accepted in 2004. At the ceremony, held almost exactly 111 years after the discovery of Röntgen rays, the new element was baptized. Roentgenium is currently the heaviest officially recognized element. It is 272 times heavier than hydrogen.

At the naming celebration Minister Schavan said of the new element, "This scientific feat has dramatically demonstrated the position of the GSI as one of the foremost centers for fundamental physical research." She completed the ceremony by placing roentgenium, symbolized by a die with the legend Rg, in the vacant place for element 111 in a large periodic table in the background. The guests were placed in the mood musically by the song "The Elements," sung by Tom Lehrer to a tune by Sir Arthus Sullivan. In the song the names of the over 100 elements are sung in quick

German Minister for Education and Science Annette Schavan (left), Sigurd Hofmann, research team leader, and Joachim-Felix Leonhard, secretary of state in the Science Ministry of the State of Hesse. (Photo: J. Guse)

succession. At the same time an animated movie was shown, synchronized with the text of the song, that showed the periodic system being built.

To produce element 111, the researchers made an atomic nucleus with 111 protons using the elements nickel and bismuth, which together have 111 protons. Using the GSI's 120-meter long ion accelerator, electrically charged nickel atoms were accelerated to approximately 30 000 kilometers per second. The nickel ions were shot at a thin foil of bismuth. The high speed overcame the repulsion between the atomic nuclei of the two elements and they merged to give an atom of element 111. These occurred only rarely. On average, one atom of roentgenium was produced in a week. The total number of atoms of roentgenium produced to date by the GSI is six.

www.gsi.de/portrait/Pressemeldungen/17112006.html

In Memoriam

IUPAC was saddened to learn of the following deaths (reported since 1 July 2005) of Union colleagues. We shall remember them with respect and gratitude for their service to IUPAC.

Dr. Daniel Alberto **Batistoni** (Argentina)—National Representative, Commission on Spectrochemical and other Optical Procedures for Analysis, 1988–2001; National Representative, Analytical Chemistry Division, 2004–2005.

Prof. Anders **Björkman** (Denmark)—IUPAC Treasurer, 1984–1991.

Prof. Thedford P. **Dirkse** (USA)—Member, Subcommittee on Solid Solubilities, 2000–2001 and 1981–1993; Associate Member, Commission on Solubility Data, 1987–1993. (Died on 23 October 2006.)

Dr. Jacques-Emile **Dubois** (France)—Member, Working Party on Molecular Characterization of Commercial Polymers, 1998–1999. (Died on 2 April 2005.)

Prof. James E. **Guillet** (Canada)—Member, Macromolecular Division: Co-opted Member, 1987–1989; Member, 1989–1993; Secretary, 1994–1997; Titular Member, 1996–1997. (Died on 23 September 2005.)

Prof. Nelson J. **Leonard** (USA)—President, Organic Chemistry Division, 1991–1993; Member, Editorial Advisory Board, 1983–1991. (Died on 9 October 2006.)

Prof. Hitoshi **Ohtaki** (Japan)—Member, Union Advisory Committee, 2004–2005; Bureau, Member, 1996–2003; Executive Committee, Member, 1998–2003; National Representative, Commission on Equilibrium Data, 1985–1991; Member, Inorganic Chemistry Division Committee, 1987–1991; Co-opted Member, Analytical Chemistry Division Committee, 1987–1989; Member, Subcommittee on Stability Constants. (Died on 5 November 2006.)

Prof. Guy **Ourisson** (France)—IUPAC Secretary General, 1975–1983; Chairman, Committee on Publications, 1973–1975; Organic Chemistry Division: President, 1971–1973; Vice-President, 1961–1971; Secretary, 1965–1969; Member, 1961–1965; Member, Commission on Chemical Taxonomy, 1965–1973. (Died on 3 November 2006.)

Prof. J. **Rigaudy** (France)—Member, Commission on Nomenclature of Organic Chemistry: Associate Member, 1981–1985; Vice-Chairman, 1975–1977; Titular Member, 1971–1975; Member, 1967–1971; Member, Interdivisional Committee on Nomenclature and Symbols, 1975–1979. (Died on 10 December 2005.)

Prof. Hans-Peter **Their** (Germany)—Associate Member, Commission on Pesticide Chemistry, 1975–1983.

Dr. Robert **Zender** (Switzerland)—Task Group Member, Internationally agreed terminology for observations in scientific communication. (Died on 12 December 2005.)

Categorizing Hydrogen Bonding and Other Intermolecular Interactions

The aim of this project is to take a comprehensive look at intermolecular interactions and classify them and to give a modern definition of the hydrogen bond, taking into account all current experimental and theoretical information, and including hydrogen bonded systems both in gaseous and condensed phases as well as in chemical and biological systems. This report summarizes the activities of the task group for this project over the last two years.

A workshop was held in Pisa, Italy, from 5–9 September 2005, in which 11 task group members and 11 other experts each gave 30-minute presentations on their recent work relevant to the project. The details of this workshop are available on the project webpage.

On 9 September 2005, the task group met to discuss the proceedings of the Pisa workshop and to produce an interim report. There was a unanimous view among the task group and workshop participants that there is no single physical force that can be characterized as hydrogen bonding or van der Waals interaction. This may be contrasted with covalent bonding (as in the H_2 molecule), ionic bonding (as in KCl molecule in the gas phase), and London dispersion forces (as in Ar_2). Hydrogen bonding is used by various scientists to describe interactions in extremes that can be summarized beautifully by an isoelectronic series, $(FHF)^-$, HF•••HF, and Ne•••HF, suggested by Legon. In $(FHF)^-$, we have a very strong hydrogen bond with a binding energy[1] of 167 kJ mol^{-1}, that borders a covalent bond. In HF•••HF, we have a typical hydrogen bond with a binding energy[2] of 19 kJ mol^{-1}, that is dominated by electrostatic forces. Finally in Ne•••HF, we have a weak interaction with a binding energy[3] of 1 kJ mol^{-1}, dominated by dispersive and inductive forces. The task group came up with an interim recommendation for the definition of hydrogen bonding and classification of intermolecular forces. This report was discussed extensively within the task group and with participants through e-mail.

A core group of Elangannan Arunan, Gautam Desiraju, Roger Klein, and Joanna Sadlej met in Bangalore from 18–22 September 2006 to finalize the recommendation. Steve Scheiner, co-chairman of the task group, participated by video-conferencing. On 18 September, a one-day meeting was organized at the Indian Institute of Science in Bangalore, with talks by the core group and five other experts. Meeting details are available at <http://ipc.iisc.ernet.in/~arunan/Bangalore_iupac_meet2.html>.

Arunan gave a brief introduction to the project and pointed out the diverse views existing in the literature on the definition of hydrogen bonding *and* on van der Waals interactions. Desiraju gave the first talk, titled "The C-H•••O and Other Weak Hydrogen Bonds: From Crystal Engineering to Virtual Screening." His talk summarized the voluminous literature existing in the domain of "weak" hydrogen bonds. In particular, he pointed out that C-H•••F interactions can be unambiguously identified from the Cambridge Crystal Structure Database, if the search is limited to fluorobenzenes rather than all molecules containing C-H and F, and other atoms. Guru Row presented results on experimental electron densities of substituted coumarins. Using Koch and Popelier's criteria[4] he showed that the C-H•••O interactions found in these systems could be classified as hydrogen bonding, but the C-H•••p interactions would be van der Waals. The key criterion that leads to this difference is the mutual penetration of atoms that depends crucially on the assumed van der Waals radii of the two bonding partners. He also presented results on organic fluorine compounds that show a bond critical point between C-F groups implying C-F•••F-C contacts.

Sadlej presented theoretical results on IR and NMR spectral properties of water clusters as a doorway to the mysteries of liquid water. She presented the OH stretching frequencies for $(H_2O)_n$ (n= 3=12) and compared them with available experimental results. She presented ^{17}O and ^{1}H chemical shifts and $^{1h}J_{OH}$ and $^{2h}J_{OO}$ spin-spin coupling constants for several clusters. She ended her talk with a question: Do these clusters really exist in liquid water? Sathyamurthy gave a talk with a title "Hydrogen bonding without borders." He showed that the binding energies for dimers have a linear relationship with the electron densities and

Group photograph from the Pisa Workshop.

the Laplacian at the bond critical points for "hydrogen bonded" complexes. He discussed the p-p interactions in a series of aromatic compounds with and without a permanent dipole moment. Jemmis gave a lecture on "The Long and Short of Weak Hydrogen Bonds." He presented electronic structure calculations on several C-H•••Y hydrogen bonded systems. Optimization of C-H distance and the energy as a function of H•••Y distance revealed that the minimum in the binding energy need not be at the minimum for the C-H distance. Hence, the C-H bond length at the energy minimum could be longer, shorter, or unchanged compared to the C-H distance in the unperturbed monomer. This could explain both red and blue shifting of C-H groups that are observed in hydrogen bonded systems.

Klein gave a talk on "Characterizing Hydrogen Bonding: Creation and Genesis." He argued that a bond-critical point must be present between the H and the acceptor atom. He pointed out the inadequacy of single van der Waals radii of atoms in confirming/ruling out hydrogen bonding. He also showed that the attractive hyper-conjugative effects exceed Pauli exchange (steric) repulsion at the optimum geometry for hydrogen bonded systems. Naresh Patwari presented a talk titled "Is Dihydrogen Bonding Analogous to Hydrogen Bonding?" He showed the strong correlation between proton affinity of the acceptor and the frequency shift observed in O-H stretching frequency in a series of hydrogen bonded complexes. However, for dihydrogen bonded complexes, this correlation worked only with an empirical correction of 0.84 (i.e., dihydrogen bonded systems are similar to hydrogen bonds, but 16 percent weaker).

In K.S. Viswanathan's talk on "Hydrogen Bonds in Cryogenic Matrices," he presented infrared spectra of several hydrogen bonded complexes observed in a matrix and showed that the experimental frequency shifts had a good correlation with the computed frequency shifts and also the binding energies of the hydrogen bonded complexes. Arunan gave the last talk of the day, titled "Hydrogen Bond Radii: From Microwave Spectroscopic, ab initio and AIM Studies." He presented microwave spectroscopic results on several H_2O and H_2S complexes and showed the structural similarities between these complexes. He also showed that the H•••Y distance could be written as a sum of hydrogen bond radius for X-H donor and an acceptor radius for Y. He presented theoretical results from ab initio and AIM calculations and showed that both the donor and acceptor radii increase from strong to medium to weak hydrogen bonds. He presented a set of "hydrogen bond radii" that may be used instead of the single set of van der Waals radii for all atoms in confirming/ruling out the presence of hydrogen bonds.

There was a panel discussion at the end that involved all the participants (about 100). The discussion centered on the use of experimental and theoretical electron density topology in confirming/ruling out hydrogen bonds. Arunan presented the evolving definition of hydrogen bonding and sought comments from everyone. After the meeting, the core group finalized the recommendation and started working on a manuscript that will justify its recommendation. This recommendation was circulated within the task group and was revised based on suggestions/criticisms. For hydrogen bonding, the proposed definition follows closely on the one given by Pimentel and McClellan.[5] It was decided to propose a short definition and a list of criteria and characteristics for hydrogen bonding.

References

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For more information, or comments, contact Task Group Co-Chairmen Elangannan Arunan <arunan@ipc.iisc.ernet.in> or Steve Scheiner <scheiner@cc.usu.edu>.

www.iupac.org/projects/2004/2004-026-2-100.html.

Recommendations for Isotope Data in Geosciences

A joint project between the Inorganic Chemistry and Analytical Chemistry Divisions of IUPAC and the International Union of Geological Sciences (IUGS) has been approved to evaluate radioisotope decay data used in the geosciences and planetary sciences for dating. Significant disparities exist between data used in these communities and those employed in physics and chemistry. The project will draw on complementary expertise represented in IUGS and IUPAC. Previous work by IUGS (Working Group "Decay Constants in Geochronology") and IUPAC (Commissions II.1 "Isotopic Abundance" and V.7 "Radiochemistry and Nuclear Techniques") will be included, harmonized,

and updated. Through the project, IUGS-IUPAC interaction will be tightened.

Initial work (2006–2008) will focus on nine nuclides used in geochronology (40K, 87Rb, 138La, 147Sm, 176Lu, 187Re, 232Th, 235U, 238U). Half-lives, decay schemes, and isotopic compositions of parent and daughter elements will be critically evaluated. Uncertainty analyses need to be adequately reassessed following ISO/GUM procedures. Successive phases will both expand the number of nuclides and refine the isotopic abundances in view of additional recommendations.

The task group, chaired by Paul Renne, includes Mauro Bonardi, Paul De Bièvre, Ales Fajgelj, Norman Holden, Dunyi Liu, and Igor Villa.

For more information contact Task Group Chairman Paul Renne <prenne@bgc.org>.

www.iupac.org/projects/2006/2006-016-1-200.html

Assessment of Fundamental Understanding of Isotopic Abundances and Atomic Weights

The International Commission on Atomic Weights was originally established in the latter part of the nineteenth century. Questions have been raised about the direction that the commission should take in the twenty-first century. Some of these questions include Who constitutes the audience for the information provided by the commission? At what time intervals is the information needed by the audience? Do synthetic elements require an atomic weight value and if so, how should these values be determined? Is a new definition of atomic weight needed and how should the uncertainties and the variation in nature of the values of the atomic weights and the isotopic abundances of the various chemical elements be treated in a consistent manner? A project has been approved to help answer some of these and related questions and to provide advice to the commission for its future efforts within IUPAC. The task group, chaired by Norman E. Holden, includes Tyler Coplen, John Karl Bohlke, Paul De Bièvre, John de Laeter, and Etienne Roth.

For more information contact Task Group Chairman Norman Holden <holden@bnl.gov>.

www.iupac.org/projects/2006/2006-025-1-200.html

Mapping of IFCC-IUPAC Laboratory Coding System to SNOMED CT*

In many countries a translation and adaptation of the SNOMED CT clinical terminology is being considered, is planned, or has been initiated, for use in national health IT systems and communications. The SNOMED CT core terminology does not support all of the needs for laboratory information in health care; specific laboratory terminologies exist to serve that purpose. A mapping has been established between concepts in SNOMED CT and the American LOINC laboratory coding system, enabling the laboratory terms to be used in a SNOMED CT context.

The IFCC-IUPAC coding system is already being used or is planned for use as a laboratory terminology in several countries. In order to integrate the use of the system with national clinical terminologies based on SNOMED CT, a systematic mapping of relations between the two systems is needed. The connection between LOINC codes and the SNOMED CT core terminology is established via a table of relations. A similar set of relations can be produced for IFCC-IUPAC codes.

Identifying related concepts in SNOMED CT for each IFCC-IUPAC code may, to a large extent, be done in a structured manner based on defined rules. The project entails the following:

- establishing a database as a tool for mapping and reporting
- determining rules for systematic mapping
- performing the actual mapping between IFCC-IUPAC properties and SNOMED CT elements—using rule-based matching where possible
- identifying concepts used in IFCC-IUPAC terminology, but not yet included in SNOMED CT

In order to ensure a close and specific mapping, cooperation with SNOMED International should be established, enabling needed concepts to be established in the SNOMED CT terminology in a planned manner.

For more information contact Task Group Chairman Ulla Magdal Petersen <ump@sst.dk>.

*SNOMED CT: Systematized Nomenclature of Medicine Clinical Terms

www.iupac.org/projects/2006/2006-008-1-700.html

The Project Place

Securing and Structural Updating of Information in the NPU Coding System and Its Environment

Work on C-NPU defining and coding properties in laboratory science has been going on since the mid-1990s. (NPU stands for Nomenclature, Properties, and Units.) The database structure designed in the 1990s was intended mainly to support the actual coding process (assembly of elements into coded properties), and the production of text files with specific fonts and formatting, intended for paper-based publication.

Terminological information about the elements, their sources, and their uses in coded properties has been stored, but frequently in an implicit manner, as part of other information elements, rather than explicitly in the database.

During almost a decade of coding work, principles and rules for the coding practice have crystallized, but have not been systematically filed. They may be extracted from stored material, like advice to users at laboratories, newsletters retiring "malformed" codes or the like, or they may be present as "silent information" in the coding environment (i.e., in the minds of the people working with the system).

The purpose of this project is to review information present in the system and its environment in order to analyze and extract implicitly stored data and register "silent knowledge." The objective is to preserve the information, render it accessible for future developers and users, and specify the needs for structured information management in the future.

For more information contact Task Group Chairman Ulla Magdal Petersen <ump@sst.dk>.

www.iupac.org/projects/2006/2006-012-1-700.html

Provisional Recommendations

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

www.iupac.org/reports/provisional

Graphical Representation Standards for Chemical Structure Diagrams

The purpose of a chemical structure diagram is to convey information—typically the identity of a molecule—to another human reader or as input to a computer program. Any form of communication, however, requires that all participants understand each other. Recommendations are provided for the display of two-dimensional chemical structure diagrams in ways that avoid ambiguity and are likely to be understood correctly by all viewers. Examples are provided in many areas, ranging from issues of typography and color selection to the relative positioning of portions of a diagram and the rotational alignment of the diagram as a whole. Explanations describe which styles are preferred and which should be avoided. Principal recommendations include:

- know your audience—diagrams that have a wide audience should be drawn as simply as possible
- avoid ambiguous drawing styles
- avoid inconsistent drawing styles

Comments by 30 June 2007

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www.iupac.org/reports/provisional/abstract07/brecher_300607.html

Further Conventions for NMR Chemical Shifts

IUPAC has published a number of recommendations regarding the reporting of nuclear magnetic resonance (NMR) data, especially chemical shifts. The most recent publication [*Pure Appl. Chem.* **73**, 1795–1818 (2001)] recommended that tetramethylsilane (TMS) serve as a universal reference for reporting the shifts of all nuclides, but it deferred recommendations for several aspects of this subject. This document first examines the extent to which the shielding in TMS itself is subject to change by variation in temperature, concentration, and solvent. On the basis of recently published results, it has been established that the shielding of TMS (along with that of DSS, often used as a reference for aqueous solutions) varies only slightly with temperature but is subject to solvent perturbations of a few tenths of a ppm. Recommendations are given for reporting chemical shifts under most routine experimental conditions and for quantifying effects of temperature and solvent variation, including the use of magnetic susceptibility corrections and of magic-angle spinning (MAS).

This document provides the first IUPAC recommendations for referencing and reporting chemical shifts in solids, based on high-resolution MAS studies. Procedures are given for relating ^{13}C NMR chemical shifts in solids to the scales used for high-resolution studies in the liquid phase. The notation and terminology used for describing chemical shift and shielding tensors in solids is reviewed in some detail, and recommendations are given for best practice.

Comments by 31 May 2007

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www.iupac.org/reports/provisional/abstract06/harris_310507.html

Structure-Based Nomenclature for Cyclic Macromolecules

A structure-based nomenclature system for monocyclic and polycyclic macromolecules is presented. Single-strand mono- and polycyclic macromolecules as well as spiro macrocyclic compounds are covered. However, rotaxanes and catenanes, which contain interlocked rings, and rings or ring systems formed by non-covalent bonds are excluded. The nomenclature of cyclic macromolecules is based on the existing nomenclature of regular and irregular polymers, which in turn is based on the nomenclature of organic chemistry also published by IUPAC. The procedure for naming a cyclic macromolecule consists of transforming it to an open chain molecule in such a way that naming of units proceeds in descending order of seniority. For polycyclic macromolecules main ring, bridges and branch units are identified and locants for branch units as well as bridges are assigned before naming according to the rules of this document. Wherever possible, examples for illustration of the naming procedure have been chosen from the literature.

Comments by 31 May 2007

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Environmental Colloids and Particles: Behaviour, Separation and Characterisation

K. Wilkinson and J. Lead
John Wiley & Sons, 2007 [ISBN 0-470-02432-1]

Written by an internationally recognized group of contributors, this book examines, through critical reviews, some of the important novel techniques for characterizing colloidal/ particulate systems. It focuses on techniques that were not examined in previous books in addition to techniques for which major advances have been made in the last decade. In addition, there is substantial critical assessment of the techniques employed for the sampling, size fractionation, and characterization of colloids and particles.

Chemical, physical, and biological processes and interactions involving colloids are described, and particular attention is paid to quantitative approaches that take account of particle heterogeneity and polydispersity. Theoretical and experimental aspects of the methods, as well as the required developments and possible recommendations, are discussed. Each chapter also gives a brief introduction general enough for the nonspecialist.

The IUPAC Series on Analytical and Physical Chemistry of Environmental Systems provides a critical evaluation of the state-of-the-art on physicochemical properties and processes in environmental systems, as well as on the analytical techniques required to study and monitor them. The series is aimed at promoting rigorous analysis and understanding of physicochemical functioning of environmental and bioenvironmental systems.

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

Practical Studies for Medicinal Chemistry

Antonio Monge and Robin Ganellin (eds)
IUPAC, 2006

The aim of this book is to provide developing countries with a practical text for studying medicinal chemistry. The book comprises 41 laboratory exercises that are intended to assist laboratory teaching of medicinal chemistry. Edited by Professors Antonio Monge (University of Navarra, Pamplona, Spain) and Robin Ganellin (University College London, UK), the book is a project of the Division VII Subcommittee on Medicinal Chemistry and Drug Development.

The exercises have been selected because they do not require unusual facilities or expensive materials. The experiments, many of which take advantage of natural resources, were collected by Monge and contributed by university laboratory research teachers in 10 countries: Argentina, Brazil, Chile, Colombia, Italy, Peru, Portugal, Spain, Uruguay, and Venezuela. All are written in English, and most are also presented in Spanish or Portuguese.

These exercises are intended for advanced students of medicinal chemistry. They are easy to reproduce and, in many cases, are interdisciplinary. Some of the exercises take natural products as the work material and none of them should present difficulties with regard to their realization. All of the experiments are available for free at <www.iupac.org/publications/cd/medicinal_chemistry/index.html>. The exercises may be freely reproduced provided that the name of the contributing author and the IUPAC source is always quoted.

The book is subdivided into the following six chapters:

- Chapter I—Physicochemical Properties
- Chapter II—Quantitative Structure-Activity Relationships
- Chapter III—Molecular Modeling
- Chapter IV—Toxicity Studies
- Chapter V—Drug Synthesis
- Chapter VI—Natural Products

Antonio Monge <cifa@unav.es> would appreciate receiving suggestions, comments, or possible new experiments. Similarly, should any exercises be translated into another language, then a copy of the translation should be sent to him to facilitate inclusion in future updated versions on the website.

www.iupac.org/publications/cd/medicinal_chemistry

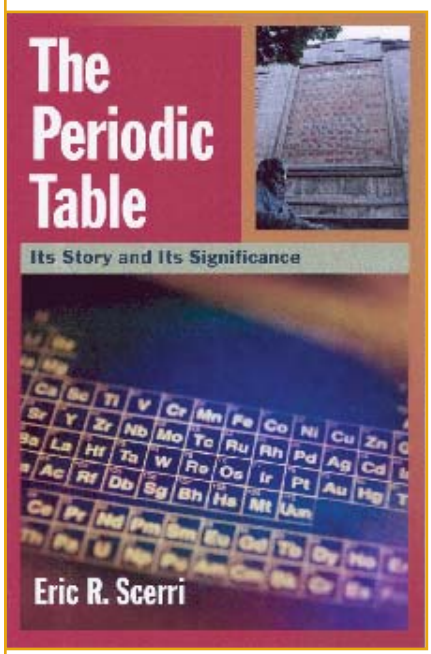
The Periodic Table: Its Story and Significance

Eric Scerri, Oxford Univ. Press, 2006
xxii + 346 pp. ISBN 0195305736

reviewed by Herbert D. Kaesz

The form of the periodic table arouses strong partisan feelings. This was evidenced when the Commission on Nomenclature of Inorganic Chemistry of IUPAC decided to resolve the dichotomy of A/B usage in the Roman numeral column heads of periodic tables. The U.S. sequence differed from the European version, leading to an ambiguity in indexing. IUPAC incurred the wrath of individuals in both camps by proposing to replace the group headings I though VIII, A/B with the Arabic numbering 1 through 18. The flames of conflict have by now died down and for instructional purposes, most textbooks now show all three conventions in the column labels of their periodic tables. The column labels of 1 through 18, however, have taken hold in the scientific literature.

This story is one of the interesting accounts that can be found in a comprehensive treatise on the periodic system compiled by Eric Scerri, a philosopher of chemistry. The work begins with 14 introductory pages in which, among other topics, Scerri presents the concept of the elements in the abstract (termed "basic substances"). In the abstract view, the symbol of element represents nothing more than its atomic number. By contrast, and to some chemists, the symbols of the elements represent their actual form in nature as gases, liquids, or solids; in their actual form the elements are termed "simple substances." One learns that Lavoisier renounced the metaphysical (abstract) concept, preferring to think of the elements in their tangible forms. In a modern sense, to emphasize the electronic structure of the elements in this manner, one may think of the symbol as representing an isolated atom of the element in a vacuum.



The first chapter is a useful overview, which is followed by a historical survey spread over chapters 2 to 5. The latter concludes with the acceptance of Mendeleev's periodic system based on the predictions and accommodations that derive therefrom.

Chapters 6, 7, 8, and 9 deal, respectively, with the nucleus and the periodic table, the electron and chemical periodicity, electronic explanations of the periodic table developed by chemists, and quantum mechanics and the periodic table. The last chapter (10) is intriguingly titled, "Astrophysics, Nucleosynthesis, and More Chemistry" in which the author presents a survey of various forms of the periodic table that have been proposed over the years. Two of these are noted here by way of example.

Many years ago, Linus Pauling placed the symbols for hydrogen and helium at the head and center of the table with arrows indicating the chemical relationship of hydrogen to two families of elements, the alkali metals on the left and the halogens toward the right. The symbol for helium was connected by an arrow to the noble gas family as displayed in the now classic textbook *College Chemistry* (W.H. Freeman & Co., 1954). One popular current text adopts a version of the Pauling table by placing hydrogen in a central position over the other elements.

A greater departure from the classical Mendeleevian form of the periodic table is the left-step or Janet table based on the periodicity of values of (n+ l) (i.e., based on similarities of electronic structure of the isolated atoms). The first row of the left-step table consists of the symbols of the two elements whose (n+ l) value is 1, namely H and He. The second row consists of the symbols of the elements Li and Be whose (n+ l) value is 2; they are placed in positions immediately below H and He, respectively. The third row consists of elements whose (n+ l) value equals 3 and is composed of the element symbols B, C, N, O, F, Ne, Na, and Mg, right justified so that Na and Mg appear below Li and Be, respectively. The fourth row of elements with (n+ l) value equal to 4 is composed of the element symbols Al, Si, P, S, Cl, Ar, K, and Ca, also right justified, and so forth.

The column at the extreme right of the left-step table thus consists of the element symbols He, Be, Mg, Ca, Sr and Ba, departing from the standard form both in the position of this column at the far right of the table and because helium is at the head of the traditional group 2 metals. The left-step or Janet Table has

not made it out of the circle of periodic table specialists. In my opinion, this is where it should stay because I believe it is more important to emphasize similarities in chemical properties than similarities in ground state electronic arrangements.

I recommend this interesting and well-written book to anyone interested in science and especially to individuals who are charged with the teaching of chemistry.

www.oup.com

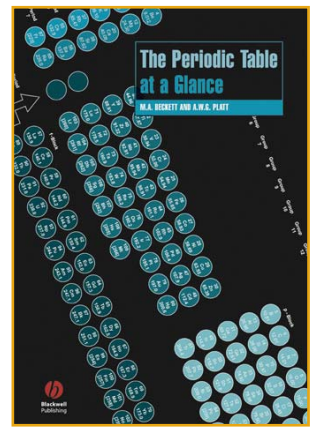
Herbert D. Kaesz <hdk@chem.ucla.edu>, a professor of chemistry emeritus at the University of California in Los Angeles, is an IUPAC Fellow. When active in IUPAC, Kaesz was a member of the Inorganic Chemistry Division, the Chemical Nomenclature and Structure Representation Division, and the Standing Committee on Chemistry and Education.

The Periodic Table at a Glance

M.A. Beckett and A.W.G. Platt
Blackwell Publishing Ltd., Oxford, UK, 2006
pp. 108 + viii, ISBN 9781405132992

reviewed by G.J. Leigh

This book is designed primarily as an inorganic chemistry review for first year undergraduates at English and Welsh (but perhaps not Scottish) universities. It will doubtless appeal to comparable students in other countries. However, it could possibly also be useful for more advanced students finishing high school. It does not aim to replace more detailed inorganic chemistry textbooks, but claims to expound principles in the context of periodicity and the periodic table. That being so, it is surprising that the complete table appears only inside the back cover, which makes it easily accessible, but somehow devalues it a bit in the eye of the new reader.



That being said, it does seem to represent a useful guide to a student who wishes to brush up on general theory. The significant text starts with atomic structure and a superficial description of electronic properties and wave mechanics, not enough for a student who is coming to these subjects for the first time. Quantum numbers and electronic energy levels are then summarized, leading to a description of the table and a list of the elements, and then finally the description of periodic atomic properties begins, on page 8. This seems about right. Finally basic redox processes are described.

The next section deals with structures of molecules, covalent bonding, hybridization, molecular shapes, metals, and crystals. Again, this is a fair if superficial summary. Thereafter, the book treats groups of atoms, starting with the alkali metals and the alkaline earths, with a nod to industrial processes. Then come the so-called p-block elements, Groups 13, 14, 15, 16, 17, and 18, with nods to more specialized matters, such as boron hydrides, siloxanes, and sulfur chemistry. Hydrogen follows, and then the largest section of the book, on transition elements, both d- and f-block elements. This necessitates some basic coordination chemistry, including discussion of stability constants, mechanisms of substitution, and ligand and crystal field theories. Some descriptive chemistry is necessarily included.

The book finishes with a reading list, but in truth it is a good summary of a lot of inorganic chemistry, which an informed student reviewing for tests would certainly find useful. However, it is not a detailed enough presentation to be used without a more substantial textbook close by, several of which spring to mind. I shall never forget, when once as a young inexperienced lecturer, I gave a public lecture full of all my ideas on periodicity, only to be met at my conclusion by an old man walking out in disgust, saying: "That's all very well, but they have to know that copper sulfate is blue." I now feel a bit like that old man. This is a good book within the limits laid down by its authors.

www.blackwellpublishing.com

G. Jeffery Leigh <g.jeffery.leigh@ntlworld.com> is a professor at the university of Sussex in Brighton, UK. He is a member of the IUPAC Chemical Nomenclature and Structure Representation Division.

Eurasia Conference on Chemical Sciences

by U.K. Pandit

The 9th event in the series of **EURASIA Conferences on Chemical Sciences** was organized from 9–13 September 2006, in Antalya, Turkey, by the Society of Biological Diversity, Ankara. The National Organizing Committee was chaired by Bilge Sener and Hitoshi Ohtaki. The choice of Turkey as a venue was especially appropriate in view of its special location and character as a bridge between Europe and Asia.

The conference, which was IUPAC sponsored, was attended by 268 participants from 35 countries. The participation of a large group of active young Turkish chemists was made possible by the financial support of the national organization TUBITAK.

The scientific program consisted of 10 plenary lectures, including one by a Nobel laureate, 35 invited lectures, 12 session lectures, 24 oral presentations, and 128 poster presentations. Topics covered in the conference program included biodiversity and natural product chemistry, biomolecular chemistry, catalysis and nanotechnology, computational chemistry, coordination chemistry (mini-symposium), environmental and analytical chemistry, and materials science and solution chemistry. The following lectures give a sense of the overall quality of the conference:

- "Search for Cytotoxic Compounds from Thai Medicinal Plants," HRH Princess C. Mahidol
- "Molecular Machines for Protein Degradation," R. Huber
- "Chemical Evolution Towards the Origin of Life," B.M. Rode
- "Semiochemicals for Insect Pest Management," T. Norin
- "Bioorganic and Chemical Biological Chemistry on the Basis of Organic Synthesis," M. Isobe
- "Chemistry and Applications of Porous Coordination Polymers," S. Kitagawa
- "Chemistry in Asia with the Cooperation of European Countries," H. Ohtaki

At the closing ceremony, prizes were awarded for the three best oral presentations and the three best posters.

Upendra K. Pandit <ukp@science.uva.nl> is a professor at the University of Amsterdam in the Netherlands. He is a long-time member of IUPAC and was president of the Organic and Biomolecular Chemistry Division.

Bilge Sener (left) and Hitoshi Ohtaki, chairpersons of the 9th Eurasia Conference on Chemical Sciences, during the closing ceremony on 13 September 2006.

Before this report went to press, news was received of the sudden and untimely death, on 5 November 2006, of Hitoshi Ohtaki. Professor Ohtaki was a much admired personality, both within IUPAC and on the international chemical scene. He enthusiastically promoted international cooperation and took it upon himself to publicize Japanese science to the wider world. His plenary lecture at EURASIA 9 will serve as a memorable contribution to that goal. Professor Ohtaki will be missed by all those who came to know him over the years.

Chemical Thermodynamics

by J.H. Dymond and M. Frenkel

The **19th International Conference on Chemical Thermodynamics**, ICCT, was held 30 July to 4 August 2006 at the University of Colorado, Boulder, Colorado, USA. The conference was part of THERMO International 2006, which also included the 16th Symposium on Thermophysical Properties and the 61st Calorimetry Conference.

W.M. Haynes was president of the Executive Board of THERMO. M. Frenkel, R.D. Chirico, and J.W. Magee were the organizers of the ICCT. The entire combined event featured 768 speakers from 62 countries (235 from North America, 341 from Europe, 76 from Japan, and 33 from China). About 65 percent of the participants were from academia, 15 percent from industry, and 20 percent from governmental and international organizations.

These individual conferences have an overlap of areas of interest, but this was the first time that they have been held jointly at the same site. This provided a unique opportunity for researchers and practitioners worldwide to meet and discuss a broad range of scientific problems in the fields of thermodynamics and thermophysical properties for a wide variety of systems, with applications in chemistry and other scientific and engineering disciplines.

After the conference's opening ceremony, W.A. Wakeham (University of Southampton, UK), gave the keynote address on "Thermophysical Property Measurements: The Journey from Accuracy to Fitness for Purpose."

Award lectures were given by Alexandra Navrotsky (the Rossini Award Lecture) on "Calorimetry of Nanoparticles, Surfaces, Interfaces, Thin Films, and Multilayers;" E.M. Woolley (the Hugh M. Huffman Memorial Award Lecture) on "A New Tool for An Old Job: Using Fixed Cell Scanning Calorimetry to Investigate Dilute Aqueous Solutions;" Carl Wieman (Fourth Touloukian Memorial Lecture) on "A Scientific Approach to Teaching Science;" S. Vyazovkin (James J. Christensen Award) on "Model-Free Kinetic Analysis: Getting the Most from Your DSC Data;" and by S. Gaisford (The Stig Sunner Memorial Award) on "All Change Please: The Direct Measurement of Change in Complex Systems." Johanna Levelt Sengers received the 2006 Yeram S. Touloukian Award.

The ICCT program consisted of nine symposia, some of which were held jointly with the other conferences. Listed below are the plenary lecturers for each symposium.

- *Electrolyte and Non-Electrolyte Solution Thermodynamics:* J.M. Prausnitz, "Some Promising Frontiers in the Thermodynamics of Protein Solutions"
- *Ionic Liquids:* Kenneth Seddon (Plenary), "The Mark of an Educated Mind"
- *Molecular Modelling, Including Simulation:* Denis Evans (Plenary), "The Fluctuation and Non-Equilibrium Free Energy Theorems—Theory and Experiment"
- *Thermochemistry and Molecular Energetics:* José Artur de Sousa Martinho Simões, "Energetics of Free Radicals: Bridges between Gas-Phase and Solution Data"
- *Thermodynamics and Properties in the Biological, Medical, Pharmaceutical, Agricultural, and Food Sectors:* P.L. Privalov, "Thermodynamic Problems in Structural Molecular Biology"
- *Databases, Data Systems, Software Applications, and Correlations:* Marco Satyro, "Life, Data, and Everything"
- *Phase Equilibrium, Supercritical Fluids, and Separation Technologies:* Stanley Sandler, "Computational Quantum Mechanics: An Under-Utilized Tool for Applied Thermodynamics"
- *Colloid and Interface Science:* Lennart Piculell, "Controlling Structure in Associating Polymer-Surfactant Mixtures"
- *New Materials:* V.K. Pecharsky, " Structure, Mechanism, and Thermodynamics of Novel Rare-Earth-Based Inter-Metallic Materials"

ICCT organizer Michael Frenkel (left), J.M.H. (Anneke) Levelt-Sengers, Earl Woolley, Rossini Lecturer Alexandra Navrotsky, and Thermophysical Properties Symposium organizer Dan Friend.

The Rossini lecture and the plenary lectures will be published in *Pure and Applied Chemistry*.

The ICCT also offered four workshops: New Experimental Techniques, with C. Schick and J.P.M. Trusler as invited speakers; Properties and Processes for a Hydrogen-Based Economy, with C.J. Peters as the invited speaker; Thermodynamic Frontiers and Education, with R.N. Lichtenthaler and R. Battino as invited speakers; and Thermodynamic Properties of Hydration, with V. Majer as invited speaker. In addition, there were software demonstrations and two afternoon poster sessions with over 400 posters.

IUPAC Poster prizes were awarded to Martinez-Herrera Melchor (Mexico), Lisa Ott (USA), and Isabel Marrucho (Spain). Doctorate Awards were presented by the International Association of Chemical Thermodynamics (IACT), with sponsorship from Elsevier. The four recipients were M. Fulem (Czech Republic); Y.U. Paulechka (Belarus); Elena Asabina (Russian Federation); and Jing Xu (Norway).

All the lectures demonstrated how chemical thermodynamics is making, and will continue to make, very significant contributions to rapidly develop-

ing interdisciplinary fields such as the life sciences, new materials, medicine and pharmacy, new energy resources, the environment, separation technologies, agriculture, and green chemistry. These are all extremely important issues for scientists worldwide, and particularly for those who are in developing or economically disadvantaged countries. The opportunity for face-to-face discussion and communication with scientists from developed countries was a great benefit, which will lead to further research and improved education.

Thermodynamics will continue to be an important area of research for many years to come, with a wide range of applications from chemical engineering to the biosciences. We look forward to the presentation and discussion of the results of further advances in chemical thermodynamics at the next ICCT, which will take place in Warsaw, Poland, in 2008.

John H. Dymond <dunmorecot@tiscali.co.uk> is secretary of the International Association of Chemical Thermodynamics. He is a research fellow at the University of Glasgow, UK. Michael Frenkel <frenkel@boulder.nist.gov> is group leader of the TRC Group in the Physical and Chemical Properties Division at the National Institute of Standards and Technology in Boulder, Colorado, U.S.A.

Physical Organic Chemistry

by Tadeusz Marek Krygowski and Krzysztof Wozniak

The **XVIII International Conference on Physical Organic Chemistry**, held 20–25 August 2006 in Warsaw, Poland, was organized by the Department of Chemistry of Warsaw University and the Polish Chemical Society. The Organizing Committee was chaired by T.M. Krygowski.

The conference began with an address by the chairman who defined its scope and topics and described scientific investigations in the vast field of physical organic chemistry. This branch of the field, which was born in the 1930s, originally concerned the mechanisms and kinetics of organic reactions and their dependence on structural and medium effects.

Nobel Prize Winner Prof. R. Huber presenting the opening plenary lecture.

The famous monograph by Louis Plack Hammett, entitled *Physical Organic Chemistry* and published in 1940, is considered a landmark in this area of research. Early research involved empirical models, which in a quantitative form allowed the investigator to interpret qualitatively a vast amount of numerical data for kinetics, equilibria, and, later, for other physicochemical, biochemical, medical, pharmaceutical, and technological properties of organic systems.

As a consequence of recent developments and research advancements, today the following fields all fall under the umbrella of physical organic chemistry: organic chemistry, bio-organic chemistry, organometallic chemistry, theoretical chemistry, catalytic chemistry, phothochemistry, supramolecular chemistry, reaction mechanisms, reactive intermediates, novel structures, reactivity relationships, solvent, substituents, isotope and solid state effects, long-lived charges, sextet or open-shell species, magnetic, non-linear optical and conducting molecules, and molecular recognition. Contributions from all these

Participants at the XVIII International Conference on Physical Organic Chemistry in Warsaw, Poland.

fields were presented at the XVIII ICPOC Conference in Warsaw.

Undoubtedly, research breakthroughs in the above-mentioned branches of physical organic chemistry have led to the development of new technologies, which in turn have lead to improvements in our every day lives. This is one of the most important reasons for IUPAC to support these kind of conferences. Our conference is one of many IUPAC activities and we feel happy that we could contribute as organizers as well as participants. With so many distinguished scientists, the meeting will likely lead to fruitful scientific developments, but it also helped to encourage new friendships and collaborations.

About 220 researchers from 31 countries participated in the conference, which featured eight plenary lectures:

- R. Huber (Nobel laureate, Germany), "Molecular Machines in Biology"
- Yonath (Israel), "The Spectacular Ribosomal Architecture: Nascent Proteins Voyage towards Folding vis Antibiotics Binding-Pockets"
- P. Coppens (USA), "Time-Resolved Diffraction Studies of Molecular Excited States and Beyond"
- K.S. Kim (South Korea), "De Novo Design Based on Nano-Recognition: Functional Molecules/Materials and Nanosensors/Nanodevices"
- I.P. Beletskaya (Russia), "Mechanistic Aspects and Synthetic Application of Carbon-Carbon and Carbon-Heteroatom Bonds Formation in Substitution and Addition Reactions Catalyzed by Transition Metal Complexes"
- S. Fukuzumi (Japan), "New Development of Electron Transfer Catalytic Systems"
- D. Braga (Italy), "Making Crystals from Crystals: A Green Route to Crystal Engineering and Polymorphism"
- L. Latos-Grazynski (Poland), "Carbaporphyrinoids: Exploring Metal Ion-Arene Interaction in a Macrocyclic Environment"

About 220 researchers from 31 countries participated in the conference, which featured eight plenary lectures, 17 invited talks, and 51 oral communications presented during two parallel sessions. There were also more than 100 poster presentations. Lecture titles are available at <http://science24.com/event/icpoc18/>.

Three IUPAC Poster Prizes were awarded: Two were decided by the Scientific Jury and one was decided by a public vote. The General Category Prize went to Natasza Spruta, Wrocław University, Poland for her poster entitled: "Dithia- and Dioxadiazuliporphyrin: Facile Generation of Carbaporphyrinoid Cation Radical and Dication." The Young Scientist Award was presented to Teresa M. Duarte, Laboratoire de Chimie de Coordination, France, for her poster "Synthesis and Excited State Properties of a[60] Fullerene Derivative Bearing a Star-Shaped Multi-Photon Absorption Chromophore." The Public Vote Prize was awarded to Anna Kropidłowska, Gdansk University of Technology, Poland, for her poster "Metal Silanethiolates with Aminopyridines as Coligands—the Role of N-H...S Bond."

A Polish folk group performs during the conference banquet.

Tadeusz Marek Krygowski <tmkryg@chem.uw.edu.pl> was chairman of the Program Committee and Krzysztof Wozniak <kwozniak@chem.uw.edu.pl> was chairman of the Local Organizing Committee for this meeting. Both are professors in the Department of Chemistry at the University of Warsaw.

High Temperature Materials Chemistry

by Herbert Ipser and Adolf Mikula

The **12th International IUPAC Conference on High Temperature Materials Chemistry** (HTMC XII), held 17–22 September 2006, in Vienna, Austria, was the twelfth conference in a series of triennial meetings, with the previous two held in 2000 in Juelich (Germany), and in 2003 in Tokyo (Japan).

The conference, which was IUPAC sponsored, was organized by the Department of Inorganic Chemistry/Materials Chemistry of the University of Vienna, the Austrian Chemical Society, and the Department

of Materials Chemistry of the Vienna University of Technology. The local organizing committee was chaired by Adolf Mikula and Herbert Ipser of the University of Vienna. Special patronage was granted by the Austrian Federal Minister for Education, Science, and Culture and by the mayor of the City of Vienna.

Conference participants in front of the Esterhazy palace in Eisenstadt, capital of the Austrian province of Burgenland.

More than 150 participants from 25 countries came to Vienna to present their research and to engage in lively scientific discussions. A considerable number of scientists, especially from Russia and some eastern countries, were able to attend the conference for the first time, partly due to financial support from the local organizers, who were able to offer reduced or waived registration fees. Many young scientists made new contacts with eachother and with senior colleagues.

The scientific topics of the meeting ranged from basic science (e.g., Experimental Thermodynamics and Modeling, Structure and Dynamics of High Temperature Materials, and High Temperature Liquid Phase Chemistry) to more applied topics (such as Lamp Chemistry or Lead-Free Soldering). The program contained nine plenary lectures, corresponding to the main topics, and two special lectures on topics of more general interest: "Do Universities Prepare for Industrial Careers" (by Knuth Consemüller, chairman of the Austrian Council for Science and Technology Development) and "The Arts: What Use to Materials Science" (by Mark Miodownik). In addition, there were 51 oral presentations and 100 posters that were on display for the entire week.

IUPAC sponsored three poster awards. The winners, as selected by an international jury, were Dario Manara of Italy ("The Uranium-Oxygen Phase Diagram at High Temperature: Recent Advances"), Yuriy Plevachuk of Ukraine ("Density and Electrical Conductivity of Liquid Al-Fe and Al-Ni Binary Alloys"), and Jiri Popovic of the Czech Republic ("Thermodynamic Optimization of the Ni-Al-W System"). The winners received a two-year subscription to *Chemistry International*, a copy of the *IUPAC Gold Book*, and a certificate signed by the IUPAC president.

www.univie.ac.at/htmc06

Adolf Mikula <Adolf.Mikula@univie.ac.at> was chairman of the Local Organizing Committee. Herbert Ipser <herbert.ipser@univie.ac.at> served as chairman of the Program Committee. Both are currently at the University of Vienna, Institute of Inorganic Chemistry/Materials Chemistry.

Chemistry in Latin America

by Roberto Cao

The **XXVII Latin American Congress on Chemistry and VI International Congress of Chemistry and Chemical Engineering**, sponsored by IUPAC, was held 16–20 October 2006 in Havana, Cuba. The congress is held every two years in a different country by the Latin American Federation of Chemistry Associations (FLAQ). The host of each biannual congress holds the presidency of FLAQ for the following two years. The event attracted 906 scientists from 33 countries (of Latin America, Europe, USA, Asia and Middle East), who gathered to discuss diverse aspects of modern chemistry and the frontiers of the field in 15 plenary lectures, 65 session lectures, 238 oral communications, and 850 posters.

Alberto Nuñez (left), president of FLAQ and of the congress organizing committee, and Paulo César Vieira, past president of FLAQ.

The congress included three symposia: Biochemistry and Molecular Biology, Perspectives of Women in Chemistry, and Chemistry and Life Sciences. In addition, a workshop on natural products and a congress on biomaterials were offered.

At the opening ceremony, welcoming remarks were given by representatives of IUPAC, International Union of Biochemistry and Molecular Biology (IUBMB), FLAQ, the American Chemical Society (ACS), and the UK Royal Society of Chemistry (RSC). Three Cuban chemists were presented with awards by the Cuban

Chemical Society: María A. Chávez, Vicente Verez, and Reynaldo Villalonga.

The opening lecture given by Sir Harry Kroto, Nobel laureate, on "Architecture at Nanoscale Dimensions," attracted great attention and was received very warmly. Three other plenary lecturers addressed different aspects of nanoscience: Hector Abruña (USA), Roberto Cao (Cuba), and Robert Corriu (France).

Sir Harry Kroto, Nobel laureate, during his presentation.

Perhaps the most distinctive characteristic of this congress was the attention given to this emerging new interdisciplinary area. In fact, a section of the conference was dedicated to nanoscience.

An important topic for Latin America, natural products, was analyzed by Alberto Nuñez, Cuba. New approaches in organic chemistry were discussed by Eusebio Juaristi (México); Margarita Suárez (Cuba), and IUPAC Past President Leiv Sydnes (Norway). A novel view of representative inorganic chemistry was addressed by Raymundo Cea, México. Education in chemistry received special attention, with a plenary lecture by Peter Atkins, UK. Medicinal chemistry was covered by Simon Campbell, past-president of RSC. Ann Nalley, president of ACS, delivered a lecture on the characteristics of science in the USA in 2006.

The areas of biochemistry and molecular biology were widely covered by the plenary lectures of Vito Turk of IUBMB (Slovenia), María A. Chávez (Cuba), André Menez (France), and by many other presentations.

At the end of the congress, Paulo César Vieira (Brazil), past-president of FLAQ, announced that the new president of FLAQ would be Alberto Nuñez, president of the Cuban Chemical Society and chairman of the organizing committee of the congress. Irma Castro is the new co-chairperson of the organization. The representatives of the different chemical associations agreed that this congress had the highest scientific level of any organized by FLAQ.

Roberto Cao <cao@fq.uh.cu> is a professor at the University of Havana, and is active in the International Affairs section of the Cuban Chemical Society.

Conference Reports Online

1st First International Environmental Best Practices Conference
7–10 August 2006, Olsztyn, Poland
report by Miroslaw Luczynski
<www.iupac.org/symposia/reports/2006/070806_ebp.html>

20th International Conference on Raman Spectroscopy (ICORS 2006)
20–25 August 2006, Yokohama, Japan
report by Hiro-o Hamaguchi
<www.iupac.org/symposia/reports/2006/200806_icors.html>

International Congress on Analytical Sciences (ICAS-2006)
25–30 June 2006, Moscow, Russia
report by Vladimir Kolotov
<www.iupac.org/symposia/reports/2006/250606_icas.html>

7th Florida Heterocyclic Conference
12–15 March 2006, Gainesville, Florida, USA
report by Lisa McElwee-White
<www.iupac.org/symposia/reports/2006/120306_flohet.html>

3rd International Symposium on Macro- and Supramolecular Architectures and Materials (MAM-06): Practical Nanochemistry and Novel Approaches
28 May–1 June 2006, Tokyo, Japan
report by Kurt E. Geckeler
<www.iupac.org/symposia/reports/2006/280506_mam.html>

45th Prague Meeting on Macromolecules "Structure and Dynamics of Self-Organized Macromolecular Systems"
9–13 July 2006, Prague, Czech Republic
report by Petr Stepanek
<www.iupac.org/symposia/reports/2006/090706_pmm.html>

Where 2B & Y

Advances in Emulsion Polymerization and Latex Technology

4–8 June 2007
Bethlehem, Pennsylvania, USA

The one-week **38th Annual Short Course: Advances in Emulsion Polymerization and Latex Technology** will be held at Lehigh University, Bethlehem, Pennsylvania, USA, from 4–8 June 2007. This course is an in-depth study of the synthesis, characterization, and properties of high polymer latexes. The subject matter includes a balance of theory and applications as well as a balance between chemical and physical problems. Lectures will be given by leading academics and industrial workers and will begin with introductory material and reviews and will progress through recent research results.

https://fp2.cc.lehigh.edu/inemuls/epi/Lehigh_sc.htm

Petra International Conference of Chemistry

26–28 June 2007
Petra, Jordan

Sultan T. Abu-Orabi, president of the Jordanian Chemical Society and president of Tafila Technical University invites the international scientific community to participate in the **Petra International Chemistry Conference** scheduled for 26–28 June 2007. The conference, which will cover all disciplines of chemistry, will be held at TTU and Petra, Jordan.

A special scientific session will be devoted to the history of chemistry and to Arab's contributions to this field during the Medieval Period. During and after the scientific sessions, participants will have the opportunity to visit numerous archeological, historical, and natural sites.

www.ttu.edu.jo/picc

Since January 2006, the Jordanian Chemical Society has been a National Adhering Organization of IUPAC, **see more on page 8.**

Challenges in Organic Chemistry

27–29 June 2007
Berlin, Germany

The **Eighth Tetrahedron Symposium** will celebrate 50 years (1957–2007) of Tetrahedron by addressing the challenges facing organic chemistry in the 21st century. The symposium is organized by Elsevier in association with Tetrahedron. As with previous events in the series, a world-class line-up of international experts will provide a comprehensive review of the state of current research and, more importantly, the challenges to future discovery. These plenary lectures are supported by poster sessions for which contributions are now invited.

Reichstag Dome, Berlin.

Topics to be covered during this anniversary event include organic synthesis, bioorganic chemistry, organic chemistry of materials, and supramolecular chemistry.

www.tetrahedron-symposium.elsevier.com

Chemistry of the Future—The Future of Chemistry

16–18 July 2007
Paris, France

The **2007 Congress of the French Chemical Society** (SFC07) will be of particular significance since it will celebrate 150 years of the French Chemical Society. Scheduled from 16–18 July 2007, just after Bastille Day, the conference will be held at the Maison de la Chimie, in the heart of the famous St-Germain quarter of Paris.

This event is dedicated to the outlook and expectations for chemistry: a broad topic which will be readily discussed during the inaugural session and during the Colloquium on Chemistry and the Needs of Society. It will then be explored further during 2 days of scientific sessions comprising 6 plenary and 36 keynote lectures within the framework of 6 thematic symposia. Poster sessions, including flash communication, will complement the main scientific sessions.

The following individuals have accepted invitations to present plenary lectures: P.-G. de Gennes (Institut Curie, Paris), J.-M. Gires (Total, Paris-La Défense), J. Goodenough (Austin), S.V. Ley (University of Cambridge, Cambridge), J.-M. Lehn (Université Louis Pasteur, Strasbourg and Collège de France, Paris) and A.H. Zewail (Caltech, Pasadena).

For more information, e-mail to <sfc07@sfc.fr>.

www.sfc07.fr

CHEM-BIO-TECH 2007

8–11 August 2007
Torino, Italy

As an integral part of the 41st IUPAC Congress, the Organic and Biomolecular Chemistry Division of IUPAC will be holding a combined **Biomolecular-Biotechnology Symposium**. This four-day CHEM-BIO-TECH symposium will comprise IUPAC's 1st Symposium on Chemical Biotechnology (ISCB-1) held jointly with IUPAC's 8th Symposium on Bio-organic Chemistry (ISBOC-8).

In designing the program, the goal has been to focus on work at the interface of biotechnology and biomolecular chemistry from which many key industrial and academic advances have sprung. The program embraces a variety of topics ranging from novel drug discovery, biosynthesis, biocatalysis, and organic synthesis through artificial enzymes and other emerging biotechnological applications. Attention will be devoted to the industry's experience in drug research and in biotechnological production.

Session Topics:

1. Natural Products, Synthesis, Biosynthesis, Isolation
2. Industrial Application of Bio-Organic Chemistry and Biotechnology
3. Bio-Organic and Bio-Inorganic Chemistry, Biosynthesis, Biocatalysis, Artificial Enzymes
4. Analytical Methods Applied to Molecular Recognition
5. Natural Products, Nucleic Acids

Francesco Nicotra <francesco.nicotra@unimib.it> (University of Milano Bicocca) is the symposium chair and Mary Garson <m.garson@uq.edu.au> (University of Queensland) is the co-chair.

See Mark Your Calendar on page 34 for contact information.

www.iupac2007.org

Molecular and Nanoscale Systems for Energy Conversion

1–3 October 2007
Moscow, Russia

The international conference and exhibition **Molecular and Nanoscale Systems for Energy Conversion** (MEC-2007) will be held 1–3 October 2007 in Moscow, Russia. Advanced systems for energy conversion based on alternative molecular and nanoscale materials will play a significant role in meeting future energy challenges. These materials will be especially important for solar energy conversion, hydrogen technologies, advanced catalytic technologies, and biofuels. This meeting aims to bring together scientists and technologists working in fundamental and applied areas to discuss recent achievements in, and the future of, alternative energy. In addition, the meeting will include an exhibition showcasing the latest industrial technological achievements in the above-mentioned fields.

The conference will feature the following main topics:

- molecular systems for photovoltaics
- nanoscale systems for photovoltaics and energy conversion
- biomimetics
- fuel cells
- catalysis for energy conversion
- biofuels
- biotechnologies for energy conversion

The conference will take place at the Emanuel Institute of Biochemical Physics of the Russian Academy of Sciences in Moscow.

Oral and poster contributions are now being accepted. Poster sessions will be an important part of the program.

See Mark Your Calendar on page 35 for contact information.

http://ibcp.chph.ras.ru/~energy/

Soil Sciences

26–30 November 2008
Pucón, Chile

Little is known about the physicochemical and biological interfacial interactions at the molecular level in the rhizosphere. The dynamics, transformations, bioavailability, and toxicity of metal pollutants, anthropogenic organics, and essential elements should be influenced enormously by the chemistry and biology of the rhizosphere. Therefore, the research on this subject matter should be an issue of intense interest on a global scale for years to come. It is for this reason that a symposium on **Soil-Root-Microbe Interactions and the Impact on the Transformation and Fate of Nutrients and Pollutants in the Ecosystem** will be held 26–30 November 2008 in Pucón, Chile. The symposium, which is IUPAC sponsored, will be the fifth in the series on Interactions of Soil Minerals with Organic Components and Microorganisms of Commission 2.5 Soil Interfacial Reactions of the International Union of Soil Sciences.

The objective of this symposium is to provide a forum in which environmental chemists and mineralogists, environmental microbiologists, ecologists, toxicologists, and soil scientists can interact, gain state-of-the-art knowledge, and identify gaps in the field. This symposium should advance the environmental chemistry of soil interfacial reactions in the rhizosphere and the subsequent development of innovative management strategies to sustain environmental quality, ensure food security and safety, and encourage ecosystem health on a global scale.

See Mark Your Calendar on page 36 for contact information.

www.ismom2008.ufro.cl

Pesticide Chemistry

July 2010
Melbourne, Australia

The **12th IUPAC International Congress of Pesticide Chemistry** will take place in July 2010 in Australia at the Melbourne Exhibition and Convention Centre. Melbourne, the second largest city in Australia, is home to eight universities and many research institutes. The host organization is the Royal Australian Chemical Institute, Inc., which is both the qualifying body in Australia for professional chemists and a learned society promoting the science and practice of chemistry in Australia.

The main topics of the conference are given below:

- Discovery of New Chemicals—synthesis; natural products; molecular biology; mechanism-based discovery of crop protection chemicals; biology of pests, diseases, and weeds
- Regulatory and Residue—chemically induced crop traits; induced chemical defense in plants; globalization and harmonization
- Formulation and Delivery—chemical ecology; attracting beneficial insects for pest management; pesticide quality; application technology; public health pesticides
- Crop Protection—problems in emerging economies
- Crop Biofactories—emerging technologies
- Environmental Fate and Safety Assessment—modelling; environmental risk assessment; environmental persistence, degradation, and transport

The next circular for the congress will contain more detailed information on the structure of the scientific program and will appear in 2007. It will be sent to those who request it by e-mail at <iupacicpc2010@raci.org.au>.

www.raci.org.au/iupacicpc2010

Mark Your Calendar

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

2007 (later than 1 May)

IUPAC poster prizes to be awarded

21–25 May 2007 • Mycotoxins and Phycotoxins • Istanbul, Turkey
XIIth International Symposium on Mycotoxins and Phycotoxins
Dr. Hamide Z. Senyuva, Tubitak-Atal, Konya Yolu No. 67, Besevler, 06530, Ankara, Turkey, Tel.: +90 312 2124620/ext.14, Fax: +90 312 2123749, E-mail: hamide.senyuva@tubitak.gov.tr

8–12 July 2007 • Nanostructured Polymers • Prague, Czech Republic
2007 Prague Meetings on Macromolecules (70th PMM)—46th Microsymposium "Nanostructured Polymers and Polymer Nanocomposites"
Prof. Libor Matejka, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovsky Sq. 2, CZ-16206 Prague 6, Czech Republic, Tel.: +420 (2) 9680-9281, Fax: +420 (2) 9680-9410, E-mail: matejka@imc.cas.cz

10–14 June 2007 • Macromolecules • Brooklyn, New York, USA
IUPAC and ACS Conference on Macromolecules for a Sustainable, Safe, and Healthy World
Prof. Christopher K. Ober, Dept. of Materials Science & Engineering, Cornell University, 310 Bard Hall, Ithaca, NY, USA 14853-1510, Tel.: +1 607-262-9108, Fax: +1 607-255-6575

26–30 June 2007 • Advanced Materials • Kharkiv, Ukraine
Modern Physical Chemistry for Advanced Materials (MPC'07)
Prof. Yuriy Kholin, Materials Chemistry Department, V.N. Karazin Kharkiv National University, Svobods Square 4, Kharkiv 61077, Ukraine, Tel.: +380 57 707 51 26, Fax: +380 57 705 12 61, E-mail: kholin@univer.kharkov.ua

8–11 July 2007 • Medicinal Chemistry • Istanbul, Turkey
6th AFMC Medicinal Chemistry Symposium (AIMECS 07)
Prof. Ismail Yalcin, Faculty of Pharmacy, Ankara University, Ankara, TR-06100 Turkey, Tel.: +90 312 223 92 53, Fax: +90 312 223 69 40

8–12 July 2007 • Greenhouse Gases • Ontario, Canada
CHEMRAWN XVII and ICCDU-IX Conference on Greenhouse Gases—Mitigation and Utilization
Dr. Gary van Loon, Department of Chemistry, Queen's University, Kingston, ON K7L 3N6, Canada, Tel.: +1 613-533-2633, Fax: +1 613-533-6669

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

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

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

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

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

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

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

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

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

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

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

1–3 October 2007 • Systems for Energy Conversion • Moscow, Russia
International Conference and Exhibition "Molecular and Nanoscale Systems for Energy Conversion"
Prof. Sergey Varfolomeev, Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Kosygin St. 4, Moscow 119991, Russia, Tel.: +7 495-137-6420, Fax: +7 495-137-4101

17–21 October 2007 • Novel Materials • Shanghai, China
3rd International Symposium Novel Materials and their Synthesis (NMS-III)
Prof. Yuping Wu, Department of Chemistry, Fudan University, Shanghai, 200433 China, Tel.: +86 21 55664223

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

5–7 November 2007 • Infrared Spectroscopy • Buenos Aires, Argentina
International Workshop on Infrared Spectroscopy Applied to Biological and Biomimetic Systems: From the Isolated Molecule to the Cell
Prof. Andrea Gómez-Zavaglia, Universidad de Buenos Aires, Facultad de Farmacia y Bioquímica, Catedra de Quimica General e Inorganica, Junin 956. 2 P, C.P. 1113. Buenos Aires, Argentina, Tel.: +54 11 4964 8249, E-mail: angoza@interar.com.ar

28 November–1 December 2007 • Metallomics • Nagoya, Japan
International Symposium on Metallomics
Prof. Hiroki Haraguchi, Department of Applied Chemistry, Graduate School of Engineering, Nagoya-University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan, Tel.: +81-52-789-5288, Fax: +81-52-789-5290, E-mail: haraguch@apchem.nagoya-u.ac.jp

Mark Your Calendar

2008

IUPAC poster prizes to be awarded

8–11 January 2008 • Agrochemicals • New Delhi, India
International Conference on Agrochemicals Protecting Crop, Health and Natural Environment,
Dr. N.A. Shakil, Division of Agricultural Chemicals, IARI, New Delhi 110 012, India, Tel.: +91 009818196164, Fax: +91 11-25843272

9–12 March 2008 • Heterocyclic Chemistry • Gainesville, Florida, USA
9th Florida Heterocyclic Conference
Prof. Alan R. Katritzky, University of Florida, Dept. of Chemistry, Gainesville, FL 32611-7200, USA, Tel.: +1 352 392 0554, Fax: +1 352 392 9199, E-mail: katritzky@chem.ufl.edu

28 July–1 August 2008 • Photochemistry • Göteborg, Sweden
XXII IUPAC Symposium on Photochemistry
Prof. Devens Gust, Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ, USA, 85287-1604, USA, Tel.: +1 602 965 4547, Fax: +1 602 965 2747, E-mail: gust@asu.edu

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

Visas

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

How to Apply for IUPAC Sponsorship

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