Chemistry in Slovenia

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Introduction

Slovenia's geographic and demographic area has witnessed an extraordinarily rich development of chemical knowledge, education, industry, and use of chemicals and chemical products, mainly because the region that is now Slovenia has been, throughout history, an active crossroads of different economic paths, interests, areas, specific features, and problems.

This article surveys the beginning, development, and present status of chemistry in Slovenia, encompassing the general evolution of both the chemical industry and chemical education as they have developed and grown.

Slovenia is a young Central European country; it declared its independence on 25 June 1991 after the breakup of Yugoslavia. Slovenia occupies an area of 20 256 km^2 and has 2 million inhabitants. The country is situated at the crossroads of four distinct geographical regions: the Alps to the north, the Pannonian plain to the northeast, the Dinaric mountain chain to the southeast, and the Adriatic coast to the south. European Union countries recognized Slovenia as an independent, sovereign state on 15 January 1992. Slovenia has been a permanent member of the United Nations since 22 May 1992, and on 6 March 1995, the European Community's Council of Ministers granted a mandate for the beginning of negotiations on the association agreement between the European Union and Slovenia.

Geographical position of Slovenia in Europe.

An old-fashioned iron smelting furnace from the northwestern, ore-rich region of Slovenia, where metallurgy had been in use from the 14th century to the beginning of the 20th century.

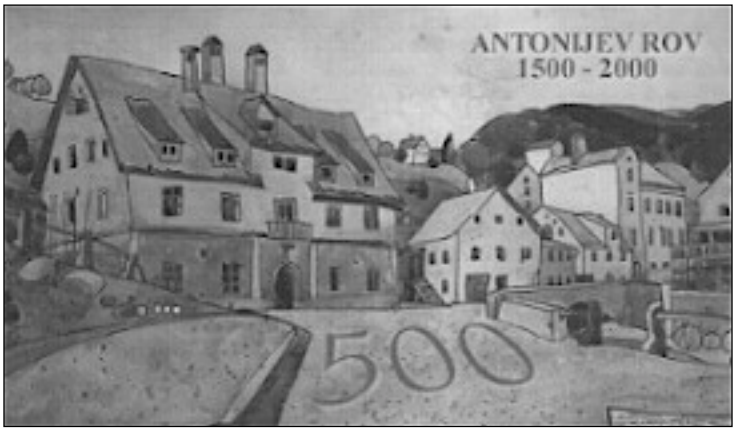
Chemistry in Pre-20th Century Slovenia

The earliest known Slovenian document, entitled *The Freising Fragments* and written in Latin script, appeared about 1000 A.D., but it was not until the 17th century that the first written text having chemistry as its subject appeared.

In the 14th and 15th centuries, as the humanist movement spread across Europe, a number of thinkers, professors, doctors, and educators of Slovenian origin were active in European universities, courts, or in diplomatic services. They were also acting as contributors in spreading information about the historical, cultural, and demographic heritage of the Slovenian nation well outside of its geographic borders.

In 1490, mercury was discovered in the town of Idrija, and the place soon became the second biggest mercury mine in the world (after Almaden in Spain). The discovery of mercury sparked considerable development of science and technology; Paracelsus, having visited the site of the mine in the early 16th century, started to exploit mercury systematically as a medicine. Scientists, mainly geologists and physicians, frequently worked in the area from the second half of the 18th century on, and they communicated their findings about

its geological and technological features throughout Europe. As a consequence of these intensive investigations, a School of Metallurgy and Chemistry was established in Idrija in 1769. (The school contributed significantly to the advancement and use of modern geological approaches to mining for the next 200 years. After World War II, geologist Ivan Mlakar made a highly original study of the complicated geological deposits of Idrija and established the internationally renowned Idrijan Geological School.)



Antonij's shaft, a visitors' entrance to the underground of the world's second largest mercury mine in Idrija.

Chemical education in Slovenia was at that time at its very beginning. The first teacher of chemistry was Baltazar Hacquet, who worked from 1782 to 1787 at the Medico-Surgery Lycée in Ljubljana. At the beginning of the 19th century, chemistry became one of the subjects taught at the Central School (renamed the Academy in 1811) in Ljubljana. Through the end of the 19th century, chemical education prospered further. Textbooks were issued; systematic chemical education was established; and papers on chemical elements, their symbols, and properties appeared. In 1898, the Agricultural-Chemical Experiment Station was built.

During the 19th century, other notable discoveries and advances were connected with the Slovenian region. Jozef Stefan, director of the Physics Institute in Vienna, Austria, discovered the law of radiation, and Austrian geographer Adolf Schmidl established speleology as a new scientific discipline on the basis of his research on phenomena in Slovenian karst caves. The most important karst topography phenomena include formation of sinkholes and caves in the barren, rocky limestone-based ground; presence of underground rivers; appearance and/or disappearance of surface streams; and absence of permanent surface rivers, streams, and lakes.

During the 19th century, chemical industry witnessed its first stage of industrialization without much significant growth or expansion. It produced mostly basic chemical products, among them soaps, candles, sulfuric acid, and potassium nitrate; there were also some refineries for mineral oils. There were specific factories producing synthetic resins; lacquers and paints (Color, Medvode); zinc from zinc ore (Cinkarna, Celje); black powder (the chemical industry of Kamnik); coatings (Jub, Dol near Ljubljana); and washing powder, cleaning agents, and cosmetics (Zlatorog, Maribor; now Henkel Slovenija).

Early 20th Century Slovenian Chemistry

Chemical Industry

Before the beginning of World War I, several chemical industry factories had been built for production of aluminum oxide (Kemicna tovarna Moste), cosmetics, cleaning agents and candles (Ilirija-Vedrog, Ljubljana), and for food processing and production (Kolinska, Ljubljana).

In the era between the two world wars, the Slovenian chemical industry experienced a rapid period of growth. During this expansion, factories were established for the production of carbides, ferroalloys, and synthetic fertilizers (Tovarna dusika Ruse); rubber, leather, and chemical products (Sava, Kranj); chemical, graphics, and paper industry (Aero, Celje); and insulating materials (Izolirka, Ljubljana).

The beginning of World War II put an end to the expansion and growth of the chemical industry in Slovenia. The majority of factories were taken over by the German army, and their industrial processes were channeled into the manufacture of military-specific products.

Chemical Education

In 1910, the first chemistry textbook in the Slovenian language, *Chemistry and Mineralogy* by Baltasar Baebler, was printed.

In 1919, the University in Ljubljana was established. The first professors of chemistry at the university were Maks Samec and Marius Rebek. They started lecturing in 1919–1920 at the newly established Institute of Chemistry. Maks Samec was a well-known chemistry teacher and the author of three German-language books and one English-language monograph on colloid chemistry of starch and cellulose.

Postwar Chemistry in Slovenia

After the end of World War II, most of the industrial infrastructure of Slovenia needed considerable repair and/or modernization. In addition, new factories were

The main building of the University of Ljubljana, erected in 1902.

built, mostly in the areas of fertilizers, pesticides, specialty chemicals, melamine- and urea-based resins, hydrogen peroxide and sodium perborate, surface protection coatings, and special additives for the textile and leather industries. The two largest pharmaceutical companies, Lek (Ljubljana) and Krka (Novo mesto), were also built during this period, in 1946 and 1954, respectively. The economy, and especially the chemical industry, developed rapidly, assuming in the mid-1950s an entirely new appearance and reaching for new markets. The chemical industry as a whole became a leading branch of the economy.

From the 1950s on, more new factories were built, including those for production of organic acids, synthetic fibers, plastics, adhesives, and cement.

According to 1997 data from the Chamber of Commerce and Industry of Slovenia, the chemical and rubber industry represented 14.9% of the total Slovenian industrial turnover, 9.8% of the total industrial labor force was employed in the chemical and rubber industry, and their contribution to the added value of Slovenian industry amounted to 18.2%.

The pharmaceutical company Krka, located amid the green scenery of the Dolenjska region, near the beautiful Krka River.

University Study

Chemical education, particularly at the university level, also felt the aftermath of World War II. There were only ten professors, four assistant professors, and eight assistants for chemistry teaching after the war ended. The governmental initiative in 1953–1954 reorganized all faculties back into one unit under the management of the University of Ljubljana. The situation then remained unchanged until the beginning of the 1960s with the same curriculum—ten semesters of study and an average of 240 students per year.

At the beginning of the 1960s, two new initiatives were launched that significantly changed the organization and scope of chemical education. First, the government passed a law establishing a three-level higher education system consisting of two-year education, full undergraduate education (four-year study), and postgraduate education (additional two-year study). Second, the university itself proposed a plan for combining science and technology as closely as possible. The result of the latter initiative was the establishment of the Faculty of Natural Sciences and Technology, within which the chemistry department consisted of four divisions: chemistry, chemical technology, textile technology, and pharmacy.

School reform at the beginning of the 1970s considerably changed the dynamics and curriculum of university studies. Organized study of chemical sciences (chemistry and chemical technology) lasted for four years, and students could benefit from another full "student-status" year. In the third year of study, students could decide on signing up for courses in either chemical technology or chemical and process engineering. The four-year curriculum also incorporated specialized study of chemical education, intended primarily for future high school teachers.

At the beginning of the 1990s, as a direct consequence of the implementation of the *matura* (secondary school graduation) exams, the Ministry of Education and Sport divided university studies into two significantly different parts. Options now included a four-year period of study leading to a university degree (B.S.), as well as a three-year curriculum leading to a specialized vocational degree.

In 1991, the Faculty of Natural Sciences and Technology split into several independent faculties, among them a newly established Faculty of Chemistry and Chemical Technology.

With the recent intention of Slovenia to join the

European Union, the European Credit and Transfer System (ECTS) was adopted. The ECTS enables the free flow of post-second-year students in any of the European universities that have signed mutual bilateral agreements.

The Faculty of Chemistry and Chemical Technology in Maribor was established in 1995 under the Act that reorganized the University of Maribor, although the study of chemistry had its roots already back in 1959 with the Technical High School. Through the years, chemical education expanded and reorganized several times, and today the study of chemical technology forms the main course taught at the Faculty. There is also the Institute for Chemical Research, which comprises eight laboratories.

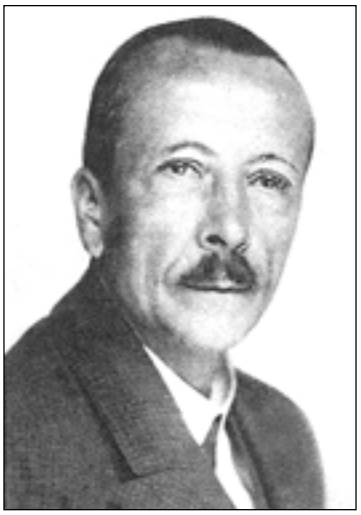
The Faculty of Environmental Sciences was established in Nova Gorica in 1995 by its cofounders, the Jozef Stefan Institute of Ljubljana and the city and community of Nova Gorica. The institution was reorganized and renamed Polytechnic of Nova Gorica in 1998. Postgraduate studies of interdisciplinary environmental sciences and economy engineering, along with the school of applied natural sciences, form the backbone of comprehensive studies supported by research laboratories, libraries, and the Technology Park of the Primorska region.

Research Work—Its Development, Importance, and Achievements

After the University was founded in Ljubljana in 1919, its first well-known chemistry professors were Maks Samec and his colleague Marius Rebek.

During his long academic career in the chemical sciences, Maks Samec, the founder of modern chemical science and the university study of chemistry in Slovenia, initiated the establishment of the Chemical Laboratory under the auspices of the Slovenian Academy of Arts and Sciences in 1946. Later on, the Chemical Laboratory was transformed into the Institute of Chemistry, which quickly became the central institution for chemical research in Slovenia. Samec also assisted in the establishment of the Slovenian Chemical Society, for which he was a leading force. He was recognized worldwide in the chemical profession for his achievements in the colloid chemistry of starch and cellulose.

Maks Samec, well-known teacher and scientist, founder of modern chemical science in Slovenia, and driving force for establishment of the Slovenian Chemical Society.



Frederik Pregl, the only Slovenian scientist ever to have received a Nobel prize in chemistry.

The only Slovenian scientist ever to have received a Nobel prize in chemistry was Frederik Pregl (1869–1930). A physician by profession, he became head of the Medical-Chemical Institute in Graz, Austria in 1913. A year later, he received Liebig's prize in recognition of his development of methods in organic microanalysis. He further developed and popularized these methods, which brought him the Nobel prize in 1923.

Two nonprofit institutions, the Jozef Stefan Institute and the National Institute of Chemistry (both located in Ljubljana, the capital of Slovenia) also perform leading research in chemistry. Besides basic and applied research, both institutes also perform target-oriented specialized research and development studies, mostly as projects stemming from collaboration with Slovenian industry. An important function of the institutes is their approach to the education of graduate and postgraduate students. Both institutes are internationally recognized and maintain extensive contact and collaboration with universities and other institutes worldwide.

Establishment, Role, and Status of the Slovenian Chemical Society

The Slovenian Chemical Society was established in Ljubljana in 1951. It unites specialists in all fields of chemistry, chemical technology, and chemical engineering, and its goals are as follows:

- to enhance progress in all fields of chemistry, exchange experience, and popularize achievements;
- to enhance professional knowledge of its members;
- to connect its members via organized activities; and
- to establish contacts with other organizations that are active in the field of chemistry.

Today the Slovenian Chemical Society has 1300 members. It is managed by a Board that is elected for a four-year term at the annual meeting. The executive body of the Board is the Executive Committee, which consists of the president, two vice presidents, two secretaries, and the treasurer.

The Society encompasses a Division of Chemistry and a Division of Chemical Engineering and Technology. Two branch offices of the Society are active in the Dolenjska region and in Maribor. These units are managed by committees whose presidents are also members of the Society's Board.

Supervision of the work of the Society's bodies is performed by the Supervisory Committee. The Code of Ethics Committee is called in to act in cases of violation of the Professional Code of Ethics.

The Slovenian Chemical Society publishes its own quarterly periodical, *Acta Chimica Slovenica*, which contains original scientific papers; survey papers on the activities of research groups; reports on investments and industrial achievements; Society news; book reviews; reports on B.S. degrees, M.S. theses, and Ph.D. dissertations from both Slovenian universities; and agendas of scientific and specialized events at home and abroad. *Acta Chimica Slovenica* is edited by an International Editorial Board, and all published papers have been internationally refereed. The publication has been indexed in *Chemical Abstracts*, *Current Contents*, and *Science Citation Index*.

The Society cooperates with national and foreign institutions, aside from being a member of the Federation of European Chemical Societies (FECS), IUPAC, the European Federation of Chemical Engineering (EFCE), and others.

Activities of the Society are carried out via ten sections, two committees, and two regional branches.

Membership in the Society is open to any person with a professional qualification in the chemical sciences at all levels of education, to practitioners in the chemical sciences, and to students. Conditions of membership include membership dues and agreement to abide by the Statutes of the Society and to adhere to the Professional Code of Ethics.

The Slovenian Chemical Society can nominate Honorary or Distinguished Service members in recognition of their outstanding contributions made to the promotion of the Society.

Primary tasks of the Committee for Chemical Terminology and Nomenclature are to monitor the development of Slovenian chemical terminology and nomenclature, and to cooperate with the Technical Committee of the Section for Terminology Dictionaries at the Institute for Slovenian Language (Fran Ramovs) of the Slovenian Academy of Sciences and Arts in preparing the third edition of the General Technical Dictionary. The aim of the Committee is to establish a terminology bulletin board where researchers from different fields of science would participate with suggestions for new Slovenian terms from their disciplines. This bulletin board would also enable researchers from other disciplines to contribute their own suggestions and comments with a view toward introducing and disseminating Slovenian chemical terminology.

Slovenian Chemical Days

Slovenian Chemical Days is the annual convention of chemists and chemical engineers that has taken place in Maribor every September since 1995. This convention is the meeting place for practitioners, users, and allied professionals from all areas of the chemical and process industries. Scientists from other countries also participate in this traditional event.

A Strategy for Educational Policy

The first two-day meeting of the ad hoc IUPAC Education Strategy Development Committee (ESDC) was held 20–21 February 2000 at the Royal Institution in London. Among the members of the committee, only one was unable to attend; in addition, Prof. Joshua Jortner, IUPAC's immediate past president, was present for the first day of the meeting. The ESDC Chairman, Prof. P. W. Atkins (Lincoln College, Oxford, England, OX1 3DR, UK; E-mail: peter.atkins@lincoln.ox.ac.uk), has provided the following letter addressed to IUPAC members and readers of *Chemistry International*. Please pass it along to your colleagues who may have an interest in educational matters.

The IUPAC Committee on Teaching of Chemistry (CTC) has had a long and honorable history under a sequence of inspired and enthusiastic chairmen. It has done notable work in fields springing from its original interests, which lie in the general domain of secondary education, and its work has been extended to include tertiary education. Its notable successes lie in its contribution to the furthering of chemistry education in developing countries, with its provision of access to inexpensive equipment, small-scale procedures, and printed resources.

Readers of *Chemistry International* will have seen (in the March issue) that as part of its general strategic development, the Bureau has decided that the time has come for IUPAC to examine its educational role, and particularly the role of the CTC, in the modern world, to encourage the CTC to broaden its horizons, to engage in a wider range of activities, and to consider its direction anew. To that end, it has set up a committee, the Education Strategy Development Committee (ESDC), under my chairmanship. The members of the committee come from a wide range of countries and represent a variety of interests. The terms of reference of the ESDC can be found on the IUPAC web site and were published in *Chemistry International*. Broadly speaking, they encourage the committee to carry out a root-and-branch analysis of the current structure of the CTC and other contributors to the educational program of IUPAC, and to look for imaginative ways to extend its reach. In particular, the ESDC is asked to consider how to incorporate into IUPAC's activities support for

ESDC Committee in front of the statue of Michael Faraday at the Royal Institution in London. Front row (left to right): N. Craig (USA), K. Powell (New Zealand), B. M. Abegaz (Botswana), F. Meyers (IUPAC Secretariat), N. Tarasova (Russia), P. W. Atkins (Chairman, UK), J. Jortner (IUPAC Past President, Israel). Back row: J. Poe (Canada), D. Balasubramanian (India), J. Bradley (South Africa), J. de Paula (USA/Brazil), L. Sydnes (Norway).

the public understanding of chemistry.

So far, the ESDC has had one meeting (at the Royal Institution in London, arguably the historical origin of public understanding of chemistry). It quickly became clear at the meeting that there was one task we had to do if we were to compile a worthwhile report—we had to discover what the members of IUPAC wanted. There are already numerous educational initiatives underway throughout the world, and the ESDC wanted to avoid replication, inappropriate expenditure of effort, and—to express it directly—the treading on of toes. What is there special about IUPAC that can lead it to make a useful, effective, and welcome contribution to chemical education throughout the world? Which of its current activities are wasteful of volunteers' enthusiasm and effort?

In an attempt to gather our stakeholders' views, I have written to a large number of organizations. However, I know that lurking in the world are numerous good ideas. I am, therefore, using the pages of this news magazine to encourage anyone who has a view to write to me. I am particularly interested in imaginative *global* visions. An idea for developing an inexpensive synchrotron storage ring, reusable litmus paper, or whatever, can wait until the newly constituted CTC (if that is our recommendation) is in place; what the committee seeks are *strategic* ideas. Where should IUPAC's educational effort be directed? Where is its current effort wasted? How can it best reach the people who will benefit from its activities? How can IUPAC's activities mesh helpfully and constructively into the infrastructure of national and individual initiatives? Where should it step aside? Where would it be most welcome? Is there a role for IUPAC in contributing to the public understanding of science? How do we deploy the new media? What new media should we anticipate?

In considering these questions (and others like them), we have in mind two sets of slices through our stakeholders. One set divides our constituency into three horizontal bands: secondary education, tertiary education, and the general public (to cover public understanding of chemistry). The second set divides our domain into the developed world, the developing world, and global issues. We are aware, for instance, that in some developed countries, there is a worrying drift away from science and from chemistry in particular. In developing countries, the principal object of concern is perhaps the expansion of the technological base through education. The most obvious global issues are the protection and reclamation of the environment and the encouragement of sustainable development. Views on any aspect of our task—or entirely different ways of approaching the problem—would be most welcome.

The committee is already working hard on a number of issues that we have identified. It will meet again in July, when we hope to be able to work toward compiling at least an interim report. That report will be infinitely more valuable if it includes ideas that reflect what the world really wants rather than what we think it needs. Please write to me or pass on your comments to other members of the committee (see the web site) by the end of May 2000.

Report on FAO/IAEA/AOAC International/IUPAC International Workshop on Principles and Practices of Method Validation, 4–6 November 1999, Budapest, Hungary

Dr. Ales Fajgelj [Quality Assurance Supervisor, International Atomic Energy Agency (IAEA) Laboratories, A-2444 Seibersdorf, Austria; E-mail: A.Fajgelj@iaea.org], Chairman of the IUPAC Interdivisional Working Party on Harmonization of Quality Assurance Schemes for Analytical Laboratories, and Dr. Árpád Ambrus (FAO/IAEA Training and Reference Centre for Food and Pesticide Control, FAO/IAEA Agriculture and Biotechnology Laboratory, P.O. Box 100, A-1400 Vienna, Austria), Chairman of the Scientific Committee, have submitted the following report:

This workshop resulted from the internationally recognized fact that full method validation carried out through an interlaboratory method performance study is an expensive but also a limited exercise. It is impossible to organize interlaboratory studies for all analytical methods in use for determination of analytes in various analyte/matrix combinations. A formal basis for the organization of the workshop was provided by the following:

- Recommendations of the FAO/IAEA Consultants Meeting on Validation of Analytical Methods for Food Control, IAEA, Vienna, 1997,
- IUPAC Project 5/97/8, "Protocol for In-House Method Validation" (Coordinators: R. Wood, M. Thompson, and A. Fajgelj), and
- IUPAC Project 5/2/99, "Preparation and Harmonization of Internationally Harmonized Guidelines for In-House Method Validation" (Coordinators: A. Fajgelj and A. Ambrus).

In all three cases, in-house method validation (single-laboratory method validation) is scientifically and technically presented as an alternative to current internationally accepted method validation practices, namely interlaboratory method performance studies. In-house method validation is described in the IUPAC, AOAC International, and ISO guidance developed in 1988.[1,2] In this respect, the present workshop might be seen as an important event because it actually discussed and established technical guidelines to be followed within

a single laboratory performing method validation. The process makes it necessary to elaborate all technical details; to change the philosophy and, consequently, the international legislation may take some years. In this process, the present workshop was an important milestone.

The aim of the workshop was to bring together scientists and representatives of different agencies, governments, standardization organizations, and accreditation bodies involved in method validation in general or in the acceptance of analytical methods for legislative purposes. Around 120 participants from 34 countries attended the workshop. International organizations [AOAC International, Food and Agriculture Organization of the United Nations (FAO), IAEA, IUPAC, European Commission, EURACHEM, etc.] were also formally represented. Fourteen participants received IUPAC financial support to attend the meeting, and they all actively participated in preparation of the workshop documents or delivered a presentation (oral or poster).

The first day of the workshop was dedicated to presentations (lectures and posters), while on the second day two draft documents were introduced and explained. Both of these documents are available upon request of the following titles:

- *IUPAC Harmonized Guidelines for In-House Validation of Methods of Analysis* (Technical Report), prepared by R. Wood, M. Thompson, and S. Ellison; and
- *Practical Procedures to Validate Method Performance and Results of Analysis of Pesticide and Veterinary Drug Residues, and Trace Organic Contaminants in Food*, a discussion document, prepared by Á. Ambrus, FAO/IAEA.

The third day of the workshop was dedicated to general discussion regarding the quality requirements to be met when analytical methods are validated and specifically to comments and recommendations regarding the two draft documents presented. For logistical reasons, the discussion focused principally on methods for pesticide and veterinary drug residues and for trace organic contaminants in food. In these fields, the use of standardized methods has a strong legislative basis. Nevertheless, the single-laboratory method validation approach is also important for all other analytical methods. In this respect, specific guidance on minimum quality criteria and other requirements will need to be prepared.

Major topics related to validation and subsequent use of analytical methods discussed at the present workshop included the following:

- IUPAC "harmonized guidelines",
- "practical procedure",
- proficiency testing,
- use of collaboratively studied methods,
- uncertainty of analytical measurement, and
- role of level of detection/level of quantitation (LOD/LOQ).

The following recommendations resulted from the workshop.

IUPAC "Harmonized Guidelines" for In-House Validation of Methods of Analysis

- The term "single-laboratory validation" is preferred to "in-house validation".
- Validation criteria recommended should be the minimum necessary to assure method performance for the intended purpose.
- A single-laboratory validation cannot assess between-laboratory variation and will provide an optimistic assessment of interlaboratory variability.
- Quality control (QC) procedures should be used within a laboratory to monitor ongoing conformance to the performance characteristics estimated during validation. These results can be used to refine the estimated performance characteristics of the method.
- Participation in interlaboratory studies enhances method validation and supports comparability of analytical results.
- Analysis of fortified test portions provides an estimate of precision and bias of the analytical method.
- Analysis of samples containing incurred residues provides an estimate of analyte homogeneity after sample processing.
- Where certified reference materials containing incurred residues are not available, determination of efficiency of extraction is beyond the capability of most laboratories.
- Laboratories should agree with clients on method performance to be achieved, including reporting limits.

The basic concept of the document and the approach of in-house method validation based on evaluation of uncertainty sources associated with each specific analytical method were largely accepted, and after revision the document will be sent to IUPAC, AOAC International, International Organization for Standardization (ISO), EURACHEM, and Cooperation on International Traceability in Analyical Chemistry (CITAC) for endorsement. Its publication in *Pure and Applied Chemistry* is expected at the end of 2000, but this document will not represent the end of the complete process. The adoption of this new approach in laboratories and its acceptance by legislative authorities will require some more time.

"Practical Procedure"

In addition to the "harmonized guidelines" and the comments given above, the following points are to be considered by FAO/IAEA expert consultation regarding the "practical procedure":

- The redraft should contain a generic approach to single-laboratory method validation for organic trace analysis.
- Specific aspects relating to pesticide and veterinary drug residues will be contained in appendices.
- The minimum list of analytes will be reconsidered to determine the most appropriate analytes to be included in multiresidue method validation (e.g., compounds that have caused problems in trade).
- The following issues should be considered within the context of the intended use of a method: parameters to be studied, criteria to be used, and number of determinations required to meet criteria.
- The terminology used in the document should be consistent with Codex, ISO, and IUPAC terms, insofar as practical.
- "Practical procedure" is subject to further elaboration by the expert group of the FAO/IAEA. Publication of the document is foreseen during the first half of 2000.

Proficiency Testing

- The "International harmonized protocol for proficiency testing of (chemical) analytical laboratories" defines the criteria for design and evaluation of proficiency tests.
- The participants raised some general concerns regarding the use and interpretation of proficiency test results and requested that these concerns be brought to the attention of accreditation authorities. These items were not intended for inclusion in either the "harmonized guidelines" or the "practical approach" final documents.
- Properly designed proficiency tests can provide information to reduce the necessity for collaborative studies of methods. If laboratories can demonstrate accurate measurement of test analytes in common samples, acceptable method performance and equivalency of methods can be inferred.
- Proficiency testing and QC are distinct procedures and cannot take the place of each other.
- Proficiency test samples should represent the types of samples encountered in actual practice, to the extent that is possible and practical.
- The scale of proficiency testing should be cost-effective for each participating laboratory.
- Coordination of national testing plans or sample exchange schemes can provide a greater range of samples and analytes for proficiency testing. Such coordination is encouraged.
- Careful evaluation of proficiency tests is required to minimize the possibility of misinterpretation of results. It is critical that the limitations of proficiency testing be recognized because registration and accreditation organizations may use results as criteria of laboratory credibility.

Use of Collaboratively Studied Methods

Collaboratively studied methods should be used when such methods are already available, suitable for the purpose intended, and required by clients or regulations.

Uncertainty of Analytical Measurement

- A clear and unambiguous definition of uncertainty of measurement in analytical chemistry is needed.
- Well-defined practical methodology is needed on how to develop meaningful data to assess uncertainty in trace analysis.
- It is especially important that the lay public and laboratory clients understand what uncertainty *means* and *does not mean* in analytical measurement.
- Measurement uncertainty should be estimated, if required, and be available to clients.

Use of LOD/LOQ

LOD and LOQ are variable estimates, the values of which depend on the conditions of measurement and the experience of the analyst. The use of these estimates in client reports can be misleading. In view of this problem, participants requested that the FAO/IAEA expert consultation following the workshop consider, as an alternative, that the lowest calibrated level of the analysis be used in client reports.

Proceedings of the workshop, including most of the presentations (lectures and posters) will be published in a special proceedings series book by the Royal Society of Chemistry (RSC) during the first half of 2000 and can be ordered directly from the RSC.

The decision of the local organizers at the Plant Health and Soil Conservation Station of Budapest to hold the workshop in the amenable environment of the Hungarian Academy of Sciences resulted in three intensive and productive days of meetings.

[1]W. Horwitz. *Pure Appl. Chem.* **60**, 855–867 (1988).
[2] W. D. Pocklington. *Pure Appl. Chem.* **62**, 149–162 (1990).

Report on ICSU/IUPAC Southeast Asian Workshop on Molecular Basis of Biodiversity: Conservation and Sustained Innovative Utilization, 26–28 November 1999, Bangkok, Thailand

Prof. Dr. Yongyuth Yuthavong [Director, Thailand Graduate Institute of Science and Technology (TGIST), National Science and Technology Development Agency (NSTDA), 73/1, Rama VI Road, Rajdhevee, Bangkok 10400, Thailand; E-mail: yongyuth@nstda.or.th], Provisional Member of the IUPAC Organic and Biomolecular Chemistry Division (III) Committee and Member of the Subcommittee on Bioorganic Chemistry, has submitted the following report:

Thirty-seven participants from Southeast Asia (China, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) and Europe were invited to this workshop, which was jointly organized by the International Council for Science (ICSU); IUPAC; the United Nations Educational, Scientific, and Cultural Organization (UNESCO); and the National Center for Genetic Engineering and Biotechnology (BIOTEC)/NSTDA.

Program

The program at the Siam City Hotel in Bangkok consisted of the following activities:

Keynote Addresses

- "Global risk/benefit sharing in pharmaceutical innovation", A. E. Fischli, IUPAC
- "Biotechnology–biodiversity, two sides of the same coin: A Thai context", S. Bhumiratana, Director of BIOTEC
- "Role of international networks in cooperative research and development", D. StC. Black (Australia)

Discussion

- Bioresources: "To share or not to share", led by Y. Thebtaranonth (Thailand)
- Biodiversity: "Enhancing biodiversity value for securing future human needs", led by S. Sastrapradja (Indonesia)
- Biodiversity: "International perspectives on biodiversity, conservation, and sustained innovative utilization", led by J. A. McNeely (Switzerland)
- Bioresources: "Recommendations for future cooperation", led by Y. Yuthavong and A. E. Fischli

Field Trip to "Five-Province-Junction" Forest, Chacheongsao

- "Introduction to Khao Ang Ru Nai Wildlife Sanctuary", T. Prayurasiddhi (Thailand)
- "Study of Biodiversity in Khao Ang Ru Nai Wildlife Sanctuary Nature Trail", led by T. Prayurasiddhi and P. Polsena, Natural Resources Conservation Center, Royal Forest Department (RFD)

Recommendations Document

The workshop resulted in the drafting of the following Recommendations for Global Cooperation on Sustainable Prospecting for Molecular Systems and Information at the Molecular Level from Natural Resources:

Introductory Remarks

Biodiversity is a complex issue requiring global coordinated attention from various fields of the physical, biomedical, and social sciences. One salient aspect of biodiversity is chemical in origin. The unique and diverse molecular libraries provided by the planetary flora and fauna have been a source of immense practical value to mankind. As a corollary, bioresources serve as a treasure house of as yet to be identified molecular templates whose potential significance cannot be conceived at the present time. This treasure must be held in trust for future generations.

Different parts of the globe have different degrees of complexity of their biological resources. International cooperation is, therefore, required to ensure that the benefits of global bioresources can be equitably and fairly distributed. Not all regions are in an ideal position today to obtain the maximum benefit from those assets. The necessity for mutually advantageous global cooperation in the utilization of bioresources is obvious. An essential element of such a common effort is the equitable benefit-sharing between the partners. This topic was the subject of several declarations [including the Manila Declaration (February, 1992); the Bukit Tinggi Declaration (October, 1992); the Melaka Accord (June, 1994); and the Phuket Declaration (November, 1997)]. It was also addressed on a broader international level at the United Nations Conference on Environment and Development in Rio de Janeiro in June, 1992, and it has been enshrined in international law through the Convention on Biological Diversity.

Innovative utilization of bioresources links society, governments, academia, and industry. They are the main stakeholders in both the preservation and utilization of bioresources, investing in and, at the same time, benefiting from the products and services originating from those assets. Any activity that adds value to a biological resource can help to support its conservation by making its sustainable use more relevant to society, and increasing public awareness of this relationship should be promoted. Because molecular systems or information at the molecular level is used in the chain of value enhancement, the chemical community is called upon to contribute to the discussion of the various scientific, economic, and ethical issues that are associated with

this type of international cooperation. To this end, IUPAC, the only independent global association of scientists responsible for chemistry, can and must play a crucial role in developing suitable recommendations [see IUPAC Recommendations on the Preservation of Natural Biodiversity in Context of Search for Economically Valuable Medicinal Biota, *Pure and Applied Chemistry*, Vol. 68, No. 12, pp. 2325–2332, 1996]. This effort should be carried out in close collaboration with the International Council for Science (ICSU).

Aspects of Global Cooperation

Three overlapping areas of international cooperation can be distinguished:

- exchange and generation of new scientific knowledge, resulting finally in rapidly published data accessible to everybody at no cost (academic exchange),
- selection of new knowledge generated, which by decision of the parties involved must be protected by patents prior to eventual later publication (early steps in innovation), and
- cooperation of partners focusing on the development of new products or services with an expected economic output (commercial cooperation).

It is important to emphasize at the outset, that in developing international guidelines for cooperation, an approach that is anchored in the recognition of mutual interest and mutual trust is absolutely essential. Personal collaboration is essential for teaching and research, and should be facilitated. The truism that we live in a global village is certainly valid in this context. Working together for the benefit of society and the environment must be the main objective of all parties. Once the basic common values are recognized, the first step in initiating the process toward formulating any guidelines requires the assemblage of parameters that define the authority, interest, investments, and obligations of the interacting partners. Subsequently, a phalanx of parameters should be identified that will constitute the functional framework acceptable to either side. Whereas ICSU/IUPAC have the mandate and responsibility to furnish the stakeholders with scientific input and the proposed form of any recommendations, legislative aspects must be addressed by appropriate governmental bodies.

Recommendations

Preamble

The parties involved

- recognize the sovereign rights of states over their own natural resources and the authority of national governments to determine access to biological and genetic resources, subject to national legislation;
- are dedicated to the conservation of biomolecular resources for future generations;
- recognize the vital role of science worldwide in education, research, and innovation;
- recognize the contributions that the molecular diversity of natural products from the biome have made to the health and welfare of humankind;
- affirm their commitment to cooperate fairly and equitably with stakeholders for the benefit of humankind in the sustainable utilization and development of biomolecular resources;
- acknowledge the interests of other stakeholders from the country or from abroad, including indigenous and local communities and farmers, in natural and genetic resources and associated information;
- are determined to honor the spirit of international, regional, national, and subnational laws and policies concerning biological and molecular diversity;
- are committed to ensure fair and equitable sharing of benefits arising from the sustainable utilization of natural resources;
- are dedicated to the fostering of research, accumulation, and dissemination of knowledge at the molecular level; and
- are dedicated to the enhancement of the scientific and technological expertise and resources of less-developed countries.

The parties have agreed to the following guidelines.

Authorization

- All academic exchange, cooperative early steps in innovation, and commercial cooperation have to be conducted under the auspices of appointed authorities.
- All countries should facilitate the rapid and efficient formulation of contracts between interacting partners.

Interests

- Academic interaction is directed at generating fundamental scientific knowledge in the first instance. Such basic knowledge may be translated into commercial products and services when this process becomes economically beneficial.
- There is a genuine interest of all partners in the translation of scientific knowledge into commercially viable products and services, and in the equitable sharing of benefits ensuing from them.
- Commercial cooperation aims to develop marketable products and services and to guarantee an optimal return on investment.
- All cooperating partners desire fast and simple regulations that govern activities of their common undertaking. A slow and complex bureaucracy would negatively influence cooperation.

- Bioresource-rich countries have an interest in enhancing their technical training and improving their facilities, as well as in ensuring the sustainable management of their natural resources and harnessing biodiversity for economic development.
- Partners from regions with advanced technology are motivated by the search for novel molecular structural templates, the underlying biomolecular chemistry, and the development of their economic potential made available by the partnership.
- All partners should appreciate each other's genuine interests and work in a spirit of mutual understanding, common accountability, and trust.

Investments

- Authorities in bioresource-rich countries should invest in infrastructure facilitating the emergence of small- and medium-sized R&D enterprises (SMEs), as they will become the potential main business partners of global innovation.
- Bioresource-rich countries offer the biota within their jurisdiction for scientific investigation. They also contribute traditional information on empirical correlations between biocomponents and their potential use.
- The partners from countries with advanced technology provide modern technical expertise for the isolation, identification, evaluation, and eventual generation of molecular libraries of biocomponents judged to be of value. They are bringing in their share of financial commitment as well, from both private and public sources.
- Bioresource-rich countries contribute technical manpower and field labor to the project. The technical manpower is a contributor, as well as a receiver, of enhanced technical training.
- All cooperating parties should contribute appropriately to the financial investments supporting the project.

Obligations

- The terms of any contract constitute the basis of the formal obligations for all parties.
- The partners should ensure the free flow of scientific information between themselves and with the scientific community. They should collaborate in the publication of scientific results, if needed, after due protection of economic interests of any partner, and be guided by the clauses of eventual patent laws.

Benefit Sharing

- Partners will assure that the benefits arising from the utilization of bioresources are shared fairly and equitably.

This workshop is part of the ongoing activities of the IUPAC Divison III project "Molecular Basis of Biodiversity: Conservation and Sustained Innovative Utilization" (Project Leaders: A. E. Fischli and U. K. Pandit).

Report on International Bureau of Weights and Measures (BIPM)—Consultative Committee for Amount of Substance (CCQM) Working Group Meeting and Workshop on Measurement Uncertainty, 29 November–3 December 1999, Paris, France

Dr. Ales Fajgelj [Quality Assurance Supervisor, International Atomic Energy Agency (IAEA) Laboratories, A-2444 Seibersdorf, Austria; E-mail: A.Fajgelj@iaea.org], Chairman of the IUPAC Interdivisional Working Party on Harmonization of Quality Assurance Schemes for Analytical Laboratories, has submitted the following report:

As a successor to Prof. Folke Ingman in the position of IUPAC representative to the Consultative Committee for Amount of Substance (CCQM), International Bureau of Weights and Measures (BIPM), Paris, France, I attended a working group meeting and a workshop on measurement uncertainty held 29 November–3 December 1999 at BIPM.

General Information and Observations

CCQM is a technical committee that operates as a part of BIPM, a central international metrological organization. CCQM was established in 1993 to support the BIPM mandate in

- establishing fundamental standards and scales for measuring principal physical quantities and maintaining international prototypes,
- carrying out comparisons of national and international standards,
- ensuring coordination of corresponding measurement techniques, and
- carrying out and coordinating measurements of fundamental physical constants relevant to these activities in the field of chemical measurements.

Working Groups (WGs) carry out the technical work of CCQM. Present WGs are grouped in two fields, as follows: i) primary methods, such as isotope dilution mass spectrometry, coulometry, static and dynamic analysis of gas mixtures, titrimetry, determination of freezing point depression, and NMR spectroscopy as a

primary method; and ii) international comparisons, including key comparisons, organic analysis, inorganic analysis, gas analysis, and pH.

In one of the most important events related to international metrological harmonization in the last decade, 49 countries signed the Mutual Recognition Arrangement (MRA) in October 1999. The MRA provides a formal basis for mutual acceptance of national measurements standards and of calibration certificates issued by national metrology institutes.

To assure and demonstrate the comparability (reproducibility of measurement results) between the measurements carried out by respective national metrological institutions, many international comparisons are being organized. Each international comparison—key comparison—is first organized as a pilot study. Several metrological institutions take part in the characterization of a selected material and establish the best estimate of a "true value" for analytes of interest and a target value for the associated measurement uncertainty. Although metrological comparisons organized by CCQM are not intended for production of reference materials, the technical principles are exactly the same. For this reason, such work carried out by CCQM is of great interest to IUPAC in general and especially to IUPAC's Analytical Chemistry Division and its Interdivisional Working Party on Harmonization of Quality Assurance Schemes for Analytical Laboratories.

In most cases, those institutions participating in pilot studies are also the main reference materials-producing organizations, e.g., National Institute of Standards and Technology (NIST), Institute for Reference Materials and Measurements (IRMM), LGC, etc. The results of pilot studies are discussed within WGs, and all the technical reasons for eventual discrepancies are investigated before any outliers are identified and before any decision on acceptance of results is taken.

I participated in the work of the WGs on Organic Analysis and Inorganic Analysis and at the workshop on measurement uncertainty organized in the framework of this CCQM meeting. Some of the following points raised during a discussion in the WGs or at the measurement uncertainty workshop might be of interest to IUPAC members; for example:

At the WGs discussion of international laboratory comparisons:

- For complicated analyses or when the complete material has to be used, more than one sample bottle (vial) is provided to the participants. One bottle is provided for training purposes.
- There is no general guidance on how participants' data should be statistically treated. Arithmetic mean, weighted mean, median, and total median are used to express the best estimate of a "true value" on the basis of the organizers' decision in each comparison separately.
- Criteria for data acceptance in international key comparisons are set up during pilot studies. They are established by a small number of laboratories (with demonstrated quality). The measurement capability of these laboratories has to be demonstrated at regular intervals (at least once per year). Pilot studies should define "what is reasonably achievable".
- Laboratories participating in pilot studies can withdraw their data at any time. Laboratories participating in key comparisons cannot withdraw data after submission.
- Large differences in perception between the theoretical and practical approaches related to the traceability of analytical results exist even between metrological institutions.
- Problems with inhomogeneity of intercomparison samples are often observed.
- Problems with shipment of some types of materials (liquid samples on trans-Atlantic flights, customs regulations, etc.) are often reported.
- The extent of instructions given to the participants was discussed. Regardless of the instructions given, there are always some laboratories that are not following the instructions.

At the measurement uncertainty workshop:

- What are the consequences of the given mean value and associated uncertainty? In many cases, uncertainties of results reported from different laboratories do not coincide with those given as target values. Which data are still acceptable?
- How should we combine results and associated uncertainties from a single laboratory, as well as sets of data from different laboratories?

Most of the discussion points are still open questions. No general answers were provided, and there is still a lot to do in the harmonization of these open questions.

At this CCQM meeting, an important change in the perception and classification of primary methods of analysis was observed. The potential of all techniques to demonstrate traceability of measurement results obtained to the International System of Units (SI) should be reinvestigated. It was pointed out that analytical techniques could not be declared as primary *per se*. Their potential should be demonstrated for each sample/measurand/analyte/technique combination. For this reason, as a first step in this direction, an international symposium was planned for April 2000 at BIPM. In connection with the "single-laboratory method validation principle" proposed and discussed at the AOAC/FAO/IAEA/IUPAC Workshop in Budapest in November

1999 (see article on page 71), this new perception of primary methods of analysis is very promising for different analytical techniques. Being declared as primary and accepted as fully validated, analytical techniques might be applied to a wide range of analysis required for legislative and international trading purposes.

Persons Contacted

As agreed before the meeting, I had the opportunity to meet individually with Dr. Terry Quinn, Director of BIPM; Dr. R. Kaarls, CCQM President; and Dr. R. Davis, CCQM Executive Secretary.

In all cases, the importance of international cooperation in the field of chemical metrology was pointed out. The relationships between BIPM, CCQM, and IUPAC were found to be successful. National and international needs relating to metrology are well elaborated in the report prepared by BIPM for governments of Member States of the Convention of the Metre in 1998. (Copies are available free of charge from BIPM.) It was pointed out that IUPAC input into metrology in chemistry might even be larger.

Next Meeting

The next meeting of CCQM took place 4–7 April 2000 at BIPM in Sèvres, France. It was combined with the working group meetings and with the international symposium on primary methods.

For more information about BIPM and CCQM, visit the BIPM web site at http://www.bipm.fr/.

Reports from IUPAC-Sponsored Symposia

4th International Symposium on Functional Dyes, 31 May–4 June 1999, Osaka, Japan

The 4th International Symposium on Functional Dyes—Science and Technology of Functional π-Electron Systems was held at Cosmosquare International Education and Training Center, Osaka, Japan from 31 May–4 June 1999 under the cosponsorship of IUPAC and the Kinki Chemical Society of Japan. This symposium followed the first symposium in Osaka in June 1989, the second one in Kobe in August 1992, and the third one in Santa Cruz, California, USA in July 1995. A total of 572 participants from 21 countries registered for the 4th symposium.

The term "functional dyes" implies "functional π-electron systems". The objective of the symposium series has been to contribute to the progress of science and technology of this promising interdisciplinary field, combining biology, chemistry, physics, and potential technological applications, and to strengthen interactions between universities and industrial research laboratories. The symposium is intended to bring together scientists and engineers working on functional π-electron systems from all over the world to discuss potential progress that will take place in the future, as well as the problems remaining to be solved.

The scientific program symposium covered all aspects (from molecular design to device fabrication) of functional π-electron systems of current interest, e.g., biologically active substances, fullerenes, liquid crystals, supramolecules, and materials for electronic and photonic devices. In particular, the symposium focused on the functions of π-electron systems and consisted of

Plenary manuscripts will appear in the November 1999 issue of *Pure and Applied Chemistry* (Vol. 71, No. 11, in press).

three sessions: π-electron systems with (1) biological functions, (2) chemical functions, and (3) physical functions. The symposium included 3 plenary lectures, 18 invited lectures, 3 invited talks each at the 2 special sessions on computational chemistry and advanced materials, and 275 contributed papers in either oral (48) or poster (227) presentations.

All the participants enjoyed the high scientific quality and friendly, warm atmosphere of this symposium. The symposium helped participants to gain valuable information on further potential development in this attractive interdisciplinary field through the exchange of knowledge and ideas, stimulating young research-

ers who should carry science and technology forward into the 21st century.

On behalf of the organizing committee, we wish to express our hearty thanks for the excellent contributions and the kind cooperation of all the authors.

Profs. Eiji Osawa, Yasuhiko Shirota, and Zen-ichi Yoshida
Symposium Editors of the 4th International Symposium on Functional Dyes—Science and Technology of Functional π-Electron Systems
Osaka, Japan

IUPAC International Symposium on Ionic Polymerization (IP'99), 19–23 July 1999, Kyoto, Japan

This symposium, held in the Kyoto International Conference Hall, was sponsored by the Chemical Society of Japan, the Society of Polymer Science of Japan, the Society of Synthetic Organic Chemistry of Japan, and the Japan Chemical Innovation Institute, in addition to IUPAC.

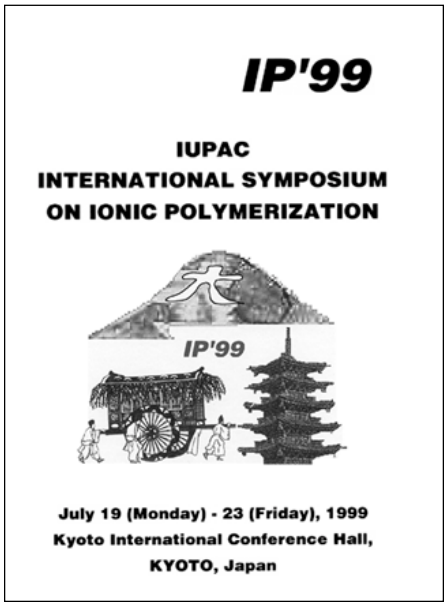
Prof. Shohei Inoue (Science University, Tokyo) was the Honorary Chairman of the symposium. Prof. Shiro Kobayashi (Kyoto University) chaired the Organizing Committee, Prof. Mitsuo Sawamoto (Kyoto University) headed the Program Committee, and Prof. Yoshiki Chujo was Chairman of the Local Committee.

The International Symposia on Ionic Polymerization have a long history. They were started in the late 1940s and early 1950s by Prof. David Pepper (Dublin, Ireland) and Prof. Peter Plesch (Keele, United Kingdom), who at that time dominated the field of cationic polymerization. Then, after the discovery of the processes of "living polymerization" by Prof. Michael Szwarc, founder and "father" of modern ionic polymerization, a series of more or less formal meetings was organized in the field of anionic polymerization. Two decades later (in 1975), I organized the first IUPAC Symposium on Ring-Opening Polymerization. Finally, the concerted efforts of a group of scientists working on anionic, cationic, and ring-opening polymerization converted these separate meetings into a chain of symposia unifying all of the fields of ionic polymerization.

The Kyoto Symposium was the third one (after Istanbul and Paris) of this new series. In attendance were more than 260 active participants, including an impressive number of younger Japanese scientists who presented high-quality lectures on the newest topics. In all, 34 invited lectures, 60 other lectures, and 61 posters were presented. Practically all of the important research centers in the field of ionic polymerization from all over the world were represented at this impressive meeting.

Lectures comparing radical and ionic polymerizations (K. Matyjaszewski) and/or enzymatic processes (S. Kobayashi) were presented, as well as other lectures on radical processes that kinetically resemble living ionic polymerization (e.g., papers by A. Matsumoto, K. Muellen, Y. Okamoto, and others). Polymerization mechanisms, macromolecular syntheses, and properties of polymers prepared by ionic and radical polymerization were also presented.

Several presentations particularly sparked my imagination, although such a selection is invariably subjective. The work of a group of authors (Percec, Barboiu, Bera, Kim, Frechet, and Grubbs) whose efforts, described by Percec, were related to the synthesis of single macromolecules of highly sophisticated, complex architecture was achieved by polymerization of well-defined dendrimers. The lecture by Matyjaszewski (mentioned above) showed how to combine ionic and radical processes in the synthesis of block copolymers of well-defined structures. Rizzardo presented an important step forward in synthesis of macromolecules with well-defined backbones by using a novel effective chain transfer. The ingenious choice of the chain transfer agents in radical polymerization allowed preparation of a number of vinyl polymers with controlled molar masses, molar mass distribution, and end-groups. Finally, Sawamoto presented his own approach to radical polymerization mediated by transition metals. It is difficult and probably impossible to predict which of the many novel radical processes will finally emerge to be become practical and routine.



Proceedings will appear in a future volume of *Macromolecular Symposia*.

Of course, understanding of the kinetic features of the processes presented would not be possible without the accumulated knowledge from living anionic polymerization and other (e.g., ring-opening) processes where the temporarily deactivated (dormant) species coexist with instantaneously active ones in the same macromolecule over various periods of time.

In already well-established areas of anionic polymerization, several speakers (Moreau, Vairon, and others) presented striking new achievements, such as copolymerization of two aldehydes to give a much lower equilibrium monomer concentration for both comonomers than in their respective homopolymerizations. This result could be expected but it was shown for the first time in the polymerization of aldehydes, and it opened up new, interesting synthetic possibilities for this vast class of monomers.

Several impressive lectures were given by seasoned scientists (Fontanille, Sigwalt, Goethals, Mueller, Higashimura, Deffieux, Zsuga, Charadame, Faust, Aida, Kubisa, Duda, and some others), all of whom have already been contributing to their fields for several decades. However, a group of excellent younger scientists (R. Gross, Y. Chujo, and others) appeared, bringing their own views to this well-explored field.

Some participants took the opportunity to visit the Kansai Research Institute, Inc., located in Kyoto Research Park, where a large proportion of scientific activity is related to macromolecular chemistry and physics. Prof. Takeo Shimidzu, Executive Vice President of this Institute, was kind enough to describe personally the major areas of research for the IP'99 Symposium visitors. An interesting social program was also planned and carried out by the charming Miyo Kobayashi, wife of the symposium chairman.

Prof. Stanislaw Penczek
Titular Member, IUPAC Macromolecular Division (IV) Committee
Associate Member, IUPAC Commission on Macromolecular Nomenclature (IV.1)
Łódz, Poland

5th International IUPAC Symposium on Bioorganic Chemistry (ISBOC-5), 30 January–4 February 2000, Pune, India

This symposium was accompanied by a pre-symposium in Delhi on "Trends in medicinal chemistry and bio-catalysis" and a post-symposium in Bangalore on "Recent trends in bioorganic chemistry". About 350 participants, many of whom came from outside India, attended the meeting in Pune. In total, 18 foreign countries were represented. The organizers had especially encouraged the participation of young Indian chemists, and the success of this objective was very much in evidence during the meeting.

The scientific program comprised 13 plenary lectures (some of which will appear in a future issue of *Pure and Applied Chemistry*), 38 invited lectures, 30 short presentations, and 115 posters, with emphasis on nucleic acids, nucleic acid components, peptides, proteins, enzymes, and designed synthetic receptors. The presentations illustrated the current role of bioorganic concepts in the interpretation of biological phenomena at the molecular level. Attention was also directed to the practical potential of this molecular-based approach. Several speakers made the point that organic chemistry constitutes a crucial component of the broader field of biomolecular chemistry. This view echoes the recent decision of IUPAC to expand the task and responsibilities of its Division of Organic Chemistry in the biomolecular area.

Lecture presentations at the symposium were of uniformly high standard. In addition, the meeting featured a large number of good-quality posters presented by young local chemists. These presentations demonstrated the vitality of Indian chemistry in general and the high level of interest in the field of bioorganic chemistry, in particular.

The symposium facilities were of excellent quality. All events, except for a half-day session, were organized in a luxurious hotel. This venue provided a practical opportunity for scientific interaction in a congenial environment. An interesting social program was arranged, and the participants were extended the traditional generous Indian hospitality.

ISBOC-5 demonstrated the dynamic quality of the field of bioorganic chemistry and its significant contribution to the understanding of the molecular basis of the biological sciences.

Prof. Upendra K. Pandit
Titular Member and Past President, IUPAC Organic and Biomolecular Chemistry Division (III)
Universiteit van Amsterdam
Amsterdam, Netherlands

New Projects

Visit http://www.iupac.org/projects/ for complete information and further links.

Environmental Analytical Chemistry—Problems Related in Part to Mining in Africa

Chemists in the developing world are faced with globalization of the economy, and regulatory chemists and lab managers need to be aware of the latest official methods of analysis. Because Africa is engaged in many heavy mining projects, it is anticipated that at least five African countries will be involved in reviewing environmental chemistry activities related to mining. Ten officials of five different chemical societies in Africa have all stated that their largest pollution problems with air, water, food, and soil stem from mining.

IUPAC's Joint Working Party with IOCD on Environmental Analytical Chemistry in Developing Countries has developed a joint project with the International Organization for Chemical Sciences in Development (IOCD) and the host for our meeting, Prof. Dr. Ernst L. J. Breet, School of Chemistry and Biochemistry, University of Potchefstroom, South Africa, to make available the latest laboratory techniques, information, and official methodology concerning environmental analytical chemistry to African analytical and supervisory chemists.

As a part of this project, a five-day regional workshop will be held 24–29 September 2000 at the University of Potchefstroom, South Africa. This workshop will address official analytical methods for water, air, food, and soils in Africa needed for problems associated with mining and other sources of pollution. Laboratory management will also be addressed, and the approach of past successful workshops of the Joint Working Party, such as the one held on Environmental Analytical Chemistry for Regulatory Chemists and Laboratory Managers in Prague, Czech Republic 16–18 June 1999 (see report in March 2000 *Chemistry International*, Vol. 22, pp. 33–34), will be followed.

Comments from the chemistry community are welcome and should be addressed to the project coordinator, Dr. Walter R. Benson, Chairperson, IOCD/IUPAC Joint Working Party, 6209 Crathie Lane, Bethesda, MD 20816-1003, USA; Tel./Fax: +1 301 229 3913; E-mail: Wbenson270@aol.com, and to the workshop host, Dr. E. L. J. Breet, Professor of Chemistry, School of Chemistry and Biochemistry, Potchefstroom University for Christian Higher Education, Private Bag X6001, Potchefstroom 2520, Republic of South Africa NR 140, Tel.: +27 18 299 2343; Fax: +27 18 299 2350; E-mail: cheeljb@puknet.puk.ac.za.

See http://www.iupac.org/divisions/current_projects/1999/6_1_99.html for project description and update.

Mycotoxin Methods for Developing Countries—Aflatoxins in Paprika, Corn, Pistachios, Peanuts, and Figs

IUPAC has approved a project to improve and validate a method based on thin-layer chromatography with prior immunoaffinity cleanup for the determination of aflatoxins in corn, peanuts, figs, pistachios, and paprika. This method is intended to be used as an alternative to high-performance liquid chromatography, especially in developing countries. For that reason, mainly laboratories from developing countries are to be involved in validating the method.

Comments from the chemistry community are welcome and should be addressed to the project coordinator, Prof. Elke Anklam, European Commission, DG Joint Research Center, Institute for Health and Consumer Protection, Food Products Unit, TP 260, I-21020 Ispra, Italy; Tel./Fax: +39 0332 785390; E-mail: elke.anklam@jrc.ei.it.

See http://www.iupac.org/divisions/current_projects/1999/6_2_99.html for project description and update.

Definitions of Terms Relating to Polymers and Functional Polymers

The chemistry of reactions and functionalization of polymers has received great attention during the last two decades. Many preparation processes of basically and industrially important reactive and functional polymers are carried out through the reactions of linear or cross-linked polymeric reactants and the introduction of reactive, catalytic, or some functional groups into polymer chains. The reactions of polymers have their specific characteristics different from those of polymerization reactions. However, clear and unified terminology has not yet been decided upon for reactions of polymers, in spite of the growing importance of the field.

IUPAC has approved a project to prepare clear concepts and definitions of general and specific terms concerning reactions of polymers and functional polymers, in order to clarify terminology in the field that results in confusion and difficulty in proper scientific and technological understanding. The preparation of definitions

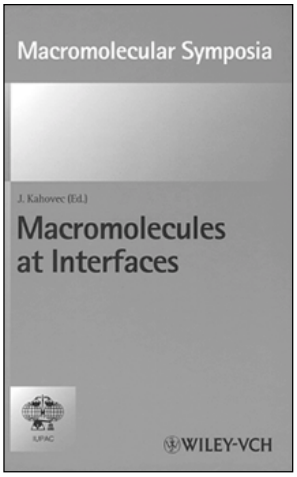
is being coordinated by Prof. Kazuyuki Horie, a Titular Member of IUPAC's Commission on Macromolecular Nomenclature (IV.1), with participation of all members of Commission IV.1. Comments from the chemistry community are welcome and should be addressed to the project coordinator, Prof. Kazuyuki Horie, Department of Chemistry and Biotechnology, University of Tokyo, Hongo, Bunkyo-ku, Tokyo 113-8656, Japan; Tel.: +81 3 5841 7312; Fax: +81 3 5841 8658; E-mail: horie@chembio.t.u-tokyo.ac.jp.

See http://www.iupac.org/divisions/current_projects/2000/4_1_00.html for project description and update.

New Books and Publications

New Books from IUPAC

***Macromolecular Symposia, Vol. 139: Macromolecules at Interfaces*. Symposium Editor, J. Kahovec; Editor-in-Chief, Hartwig Hocker; Editors, W. Guth, B. Jung, I. Meisel, and S. Spiegel. Published by Wiley-VCH, April 1999, pp. 1–135. ISBN 3-527-29807-X (ISSN 1022-1360).**



Volume 139 of *Macromolecular Symposia* contains main and special lectures presented at the IUPAC Symposium on Surface and Interfacial Phenomena held 21–24 July 1997 in Prague, Czech Republic under the sponsorship of IUPAC's Macromolecular Division. This meeting was also the 17th Discussion Conference of the Prague Meetings on Macromolecules organized by the Institute of Macromolecular Chemistry in Prague.

***Macromolecular Symposia, Vol. 143: Macromolecules*. Symposium Editor, K. P. Ghiggino; Editor-in-Chief, Hartwig Hocker; Editors, W. Guth, B. Jung, I. Meisel, and S. Spiegel. Published by Wiley-VCH, August 1999, pp. 1–370. ISBN 3-527-29903-3 (ISSN 1022-1360).**

Volume 143 of *Macromolecular Symposia* contains plenary and keynote lectures delivered at Macro98 World Polymer Congress, the 37th IUPAC International Symposium on Macromolecules, which was held on the Gold Coast, Queensland, Australia 11–15 July 1998. One thousand and seventy-five delegates attended, plus about 120 accompanying persons. Most delegates were from outside Australia, indeed coming from 45 different countries. The biennial IUPAC World Polymer Congresses provide a special opportunity for scientists to meet each other and to become aware of developments and progress in other countries. From these conferences, future links emerge between individuals and between organizations. The meeting was opened by His Excellency the Governor of Queensland, Major-General Peter Arnison. The Governor noted the international scientific and technical importance of the meeting, and indeed was able to draw on his own background (as former executive director of a company producing products for the mining, agricultural, transport, and local government services) to put the meeting in context. He noted the enormous number of benefits that are conferred on our everyday lives by artificial and natural polymers, in addition to the fascinating scientific challenges they present.

Invited speakers and contributed poster and verbal papers covered literally every aspect of polymer science and technology; there were a total of 1 050 papers presented in all. The program also included various symposia, not least of which was that on Polymer Science and Industry. Indeed, the first speaker after the Governor's opening, Dr. Peter Chan of Polymer Coating Technologies of Singapore, set the tone of scientific excellence and relevance, when he spoke on scientific challenges arising from new technology demands. Subsequent speakers in this symposium, which extended for two days, addressed scientific, technical, and societal issues. Other major components of the conference were the O'Donnell Symposium on Radiation Chemistry and Polymers, and the Symposium on Polymer Education. Other symposia were on Characterization; Polymer Synthesis; Polymers for New Technologies; Polymers; the Environment and Health Issues; Structure and Properties; Engineering Polymers; Theory and Modeling of Polymer Systems, Films, Surfaces and Interfaces; Novel Polymers; Polymer Colloids; Rheology and Processing; and Polymer Photophysics and Photochemistry. Each of these symposia was co-organized by an Australian scientist and an overseas scientist.

Australia is an old land geologically, but Australian

science is young and vigorous, and Australian polymer scientists welcomed the opportunity to host the most important biennial conference in the field at the forefront of polymer science and technology. Many components contributed to the success of this conference—especially the excellence of the delegates and the large number and vigor of the younger participants who will be the next scientific generation. An essential ingredient for a successful conference is the willingness of all participants to learn and to interact both inside and outside the lecture rooms. It was for this reason that the venue was chosen at the Gold Coast, where the networking that is vital for world science was nurtured by the pleasant environment. Delegates left the conference with new knowledge and new friends, from which will grow new science.

There were a number of special parts to this conference. One was the Young Scientists program, which encouraged interchange among research students and other young scientists from around the world. Another was the Industrial Forum, which focused on the applications of our science. These applications are vital, when financial changes pose a challenge to us all to help wealth creation, in the deepest meaning of the expression, and to improve the quality of life. The nature of our field is such that we can all help make a better world.

This conference came about because of the dedication, vision, energy, organizational skills, and enthusiasm of the late Prof. Jim O'Donnell of the Chemistry School of the University of Queensland, who died tragically of cancer three years before the conference. Jim was a fine polymer scientist and internationalist, a personal friend and mentor to many of the attendees, and one who cared greatly for international issues and for the good of young polymer scientists. The numbers and diversity of overseas delegates, and the high quality and number of the scientific papers at Macro98, are some of Jim's memorials.

Prof. Jim O'Donnell

Prof. Robert G. Gilbert, Cochair, Macro98 World Polymer Congress
President, IUPAC Macromolecular Division
Prof. Donald H. Napper, Cochair, Macro98 World Polymer Congress

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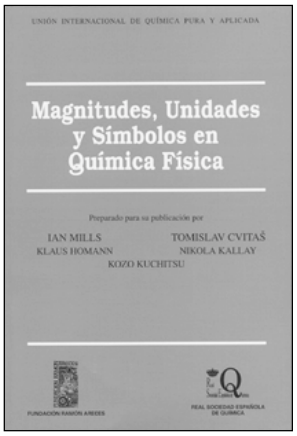
***Magnitudes, Unidades y Símbolos en Química Física*, segunda edición. Por Andrés Pérez Masiá, José M. Guil, Josefa E. Herrero, y Anselmo Ruiz Paniego. Editorial Centro de Estudios Ramón Areces, S.A., Madrid, Spain (1999), pp. ix + 1–214. ISBN 84-8004-361-X. [Spanish translation of IUPAC "Green Book", *Quantities, Units, and Symbols in Physical Chemistry*, 2nd edition. Prepared for publication by Ian Mills, Tomislav Cvitaš, Klaus Homann, Nikola Kallay, and Kozo Kuchitsu. Blackwell Science (1993), pp. ix + 1–166.]**

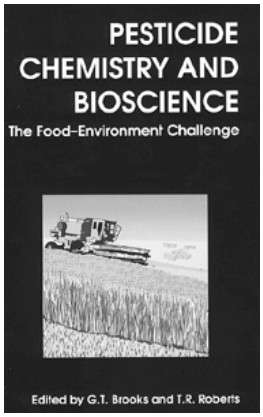


This Spanish translation of the 2nd edition of the IUPAC "Green Book" was prepared by Andrés Pérez Masiá, José M. Guil, Josefa E. Herrero, and Anselmo Ruiz Paniego, Instituto de Química Física "Rocasolano", CSIC, Madrid, Spain. It is available from Editorial Centro de Estudios Ramón Areces, S.A., Tomás Bretón, 21, E-28045, Madrid, Spain.

The 2nd edition of the IUPAC "Green Book" represents a further revision of the 1988 edition, incorporating resolutions of the Conférence Générale des Poids et Mesures (CGPM), international standards of ISO-31, and recommendations from the International Union of Pure and Applied Physics (IUPAP) and from other IUPAC commissions. Major additions beyond the 1988 edition appear in the sections on quantum mechanics and quantum chemistry, electromagnetic radiation, and chemical kinetics, in order to include physical quantities used in the rapidly developing fields of quantum chemical computations, laser physics, and molecular beam scattering. Sections have been added on dimensionless quantities, and on acronyms and abbreviations used in chemistry, and a full subject index has been added to the previous symbol index.

New Book from The Royal Society of Chemistry

***Pesticide Chemistry and Bioscience: The Food–Environment Challenge*. Edited by G. T. Brooks and T. R. Roberts. Hardcover, 1999, ix + pp. 1–438. Special Publication No. 233, ISBN 0-85404-709-3.**



Pesticide chemistry has seen many remarkable changes and advances in recent years. Further challenges must be faced to advance the field, and this book, produced as a result of the 9th IUPAC International Congress of Pesticide Chemistry (held in London 2–7 August 1998) and written by leading international experts, reports on the need to produce high-quality food while satisfying environmental concerns. Including new material on natural products, chemical synthesis, mode of action, metabolism, resistance, regulation, and risk assessment, *Pesticide Chemistry and Bioscience* updates all of the key areas in pesticide chemistry and related activities. Together, the contents outline the revolution in approaches to crop protection and in our abilities to develop complex, environmentally acceptable strategies for weed, pest, and disease control.

This collection of current expert views and findings will be of immense interest to researchers and professionals working in the field of pesticide chemistry.

To order, contact Sales and Customer Care, The Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, England CB4 0WF, UK; E-mail: sales@rsc.org; Tel.: +44 1223 420066; Fax: +44 1223 423429; Web site: http://www.rsc.org/metpath *or* http://www.chemsoc.org/.

New Publications from the World Health Organization

***Principles for the Assessment of Risks to Human Health from Exposure to Chemicals*, Environmental Health Criteria No. 210**

1999, xx + 110 pages (English with summaries in French and Spanish), ISBN 92-4-157210-8, CHF 29.-/USD 26.10; In developing countries: CHF 20.30, Order No. 1160210. WHO Marketing and Dissemination, CH-1211 Geneva 27, Switzerland; E-mail: bookorders@who.ch; Tel.: +41 22 791 24 76; Fax: +41 22 791 48 57.

This book provides a state-of-the-art review of methods and procedures for assessing the risks to human health posed by environmental chemicals. Addressed to regulatory authorities, risk managers, and other decision-makers, the book aims to demystify the principles of risk assessment and thus to encourage wider use of this powerful tool for protecting populations.

Because the detection of chemical hazards may have socioeconomic and political consequences, the book gives particular attention to methods for the accurate identification of risks and determination of their severity. Details range from an alert to sources of uncertainty in scientific evidence, through an explanation of the distinction between individual and population risks, to a list of questions commonly addressed during risk characterization. Practical advice on various options for risk elimination or reduction is also provided in this comprehensive guide.

The book has four chapters covering each logical step in the process of risk assessment. The first, on hazard identification, explains how data on a chemical's toxicity and mode of action can be used to determine whether the chemical will cause adverse effects on health. The strengths and limitations of different types of data are discussed, together with criteria commonly used to establish causality. Methods for assessing dose-response relationships are reviewed in Chapter 2, which explains how to characterize the relationship between the dose administered or received and the incidence of an adverse effect. Methods for assessing nonneoplastic, or threshold, effects and neoplastic, nonthreshold effects are described in detail.

Exposure assessment is covered in the next chapter, which describes methods for determining the nature and extent of contact with chemical substances and discusses the special characteristics of exposure in the general environment, in the workplace, and from consumer products. The final chapter explains the procedure of risk characterization as a decision-making tool that brings together estimates of exposure levels and risks and summarizes sources of uncertainty in the scientific data. Practical options for risk management are presented as a range of regulatory, nonregulatory, economic, advisory, and technological measures.

***Monitoring Ambient Air Quality for Health Impact Assessment* (WHO Regional Publications, European Series, No. 85), WHO Regional Office for Europe, Copenhagen, Denmark**

1999, 196 pages (available in English only), ISBN 92-890-1351-6, CHF 62.-/USD 55.80, Order No. 1310085.

Air quality assessment is frequently driven by the need to determine whether a standard or guideline has

been exceeded, but it should also provide the information needed to estimate population exposure to air pollution and the effects on the health of the population. Most air quality monitoring systems do not fully address population exposure to toxic air pollution. Health impact assessment combines estimates of population exposure with information on toxicity.

Given the importance of the availability of valid information on population exposure to air pollutants, the WHO European Centre for Environment and Health organized a working group to define the features of monitoring networks that allow their use in assessing the potential exposure of the population to air pollution from ambient air. This work resulted in this book. The principles outlined are intended to promote progressive modification of the networks monitoring air quality to improve their usefulness for health impact assessment.

This book is directed specifically to network managers, to those who design new networks or modify existing ones, to policy-makers, and to those who influence policy.

Guidelines for Preparing Core Clinical-Safety Information on Drugs, 2nd edition.* Including New Proposals for Investigator's Brochures. *Report of CIOMS Working Groups III (Revised) and V (New)

1999, 98 pages (available in English only), ISBN 92-9036-070-4, CHF 15.-/USD 13.50; In developing countries: CHF 10.50, Order No. 1840021.

This book is a revised and expanded edition of the first internationally agreed guidelines covering the minimum drug safety information that should be communicated by manufacturers to physicians and other prescribers. Originally published as the CIOMS Working Group III report, the "Core Safety Information" specified in the guidelines has been widely endorsed as a standard for the preparation of all official national data sheets, package inserts, product labels, and other official statements issued by manufacturers.

The original guidelines were produced in response to the need to harmonize drug safety information. As their principal objective, the guidelines aim to ensure that data sheets contain the information most needed to help prescribers balance a product's risks against its benefits, and thus make good therapeutic decisions.

The book also includes the new report of CIOMS Working Group V. This report extends the original guidelines to include recommended safety information on drugs undergoing investigation. Intended to guide the content of company investigators' brochures, this "Development Core Safety Information" then forms the basis for the core safety information eventually issued for the marketed product.

The report of Working Group V is published as an additional set of proposals for the assessment and presentation of safety information in investigators' brochures. Proposals, which follow the same practical approach used to produce core clinical safety information, are intended to provide researchers with all relevant clinical and nonclinical information and to assist pharmaceutical companies in meeting their reporting obligations. In addition, guidance is provided on the global distribution to investigators of new safety information, such as 7-day and 15-day alerts to serious, unexpected adverse reaction. The proposals should also facilitate the work of ethics review committees when assessing the benefits and risks to participants in clinical trials.

The book concludes with the text of the European Summary of Product Characteristics and a summary of the U.S. FDA Requirements, examples of illustrative drug scenarios used by the working group, and a model of Core Safety Information proposed for a fictitious drug.

Letter to the Editor

Prof. Donald Weaver wrote an interesting article (*Chemistry International*, January 2000, Vol. 22, No. 1, pp. 11–13), wherein he took to task a number of alternative medicine practices. In particular, he cited a number of instances from his own experience where patients ignored standard medical treatment for alternatives that led to their death or serious complications. In the cases he wrote about, it was clear that the patients made very poor choices. However, there are two areas of what some may consider alternative medical practices where the evidence of their benefit is quite clear.

The first of these is the research by David Spiegel, MD, who showed unequivocally[1] that psychotherapeutic support groups can have beneficial effects on *both* the mental and physical well-being of the patient. Because the readers of *CI* may not be aware of Spiegel's research, even though his seminal paper was published over eleven years ago, I will briefly summarize the work of his group and its outcomes. Spiegel's initial thesis was that a psychotherapy support group would probably be helpful in easing the burdens of cancer, but would have no effect on the physical outcomes of the disease. They enrolled 87 women who had fourth-stage metastatic breast cancer. Fifty women were in the in-

tervention group and 37 in the control group. All of the women continued to receive whatever medical treatments their doctors recommended. The women in the support group met weekly for one year. They were taught self-hypnosis for pain control, they could share whatever they wished during the meetings, were encouraged to communicate with group members outside of the meetings, and one of the group leaders was a woman who had breast cancer that was in remission. The ten-year followup showed that all of the women in the control group died, and that their average length of survival from the beginning of the study was 18.9 months (SD = 10.8). Three of the women in the support group were still alive ten years later. The 47 women in the support group who died had lived an average 36.6 months (SD = 37.6) from the beginning of the study. This work has been replicated and shows that a psychotherapy support group can have a significant effect on the longevity and quality of life of cancer patients. The important question here, given the evidence, is the following: "Why does not every oncologist prescribe group psychotherapy for his/her patients?" These support groups are probably *more* effective than any of the "standard" treatments for fourth-stage metastatic breast cancer.

Although there is little evidence for special diets and herbs for helping people with cancer and cardiovascular disease, there is a great deal of evidence that Dr. Dean Ornish's regimen of low-fat diets, support groups, exercise, and meditation[2] has a profound effect on the course of cardiovascular disease. Please note that Dr. Ornish does not recommend one diet, but a total lifestyle change in several areas. Ornish's work has stood the test of time, even though scoffers have pushed it aside as one of those alternative things. Again, the question is as follows: "Why doesn't every cardiologist encourage his/her patients to follow this regimen?"

My new book[3] cites the scientific evidence for mind/body interactions for healing, and emphasizes a multimodal approach to working with people who have life-challenging diseases. An important question is this: "How much does the placebo effect contribute to *both* traditional and alternative medicine?" A major component of all double-blind studies is to separate out the ever-present placebo effect from that of the "active" ingredient or treatment. The placebo effect is always significant, and there is a vast literature on it. (A summary of the placebo effect is in Chapter 4 of Reference 3.) Any alternative work, of course, should always be done in *cooperation* with medical doctors. As scientists, we need to be skeptical and look for scientific proof—such proof is available for the two "alternative" approaches described above.

References

1. D. Spiegel, J. R. Bloom, H. C. Kraemer, E. Gottheil. Effect of psychosocial treatment on survival of patients with metastatic breast cancer. *Lancet 2*, 8668, 888–891 (1989).
2. D. Ornish. *Dr. Dean Ornish's Program for Reversing Heart Disease*, New York: Ballantine Books (1991).
3. R. Battino. *Guided Imagery and Other Approaches to Healing*, Crown House Publishing, April 2000.

Sincerely yours,

Rubin Battino, Professor Emeritus of Chemistry
MS, Mental Health Counseling
Associate Member, IUPAC Commission on Solubility Data (V.8)
Department of Chemistry, Wright State University, Dayton, Ohio

Reports from Commissions and Division Committees

Physical Chemistry Division Committee (I.0)

Summary of Minutes of Division Committee Meeting at IUPAC General Assembly, Berlin, Germany, 7–11 August 1999

The Physical Chemistry Division Committee (PCDC) devoted much time to discussing its future structure and function. The restructuring of IUPAC, with the abolishment of Commissions, will give the Division Committee a drastically changed role with much increased responsibility and work. The Division Committee will in the future be responsible for project generation and evaluation of proposals, followup and finalization of projects, and assessment of final results. Recruitment of Committee members and distribution of work among the members will be crucial for the work of the Division under the new organization. The number of projects that will be carried will be reduced when the Commissions disappear. It was suggested that the present structure of technique-oriented Commissions be replaced by one based on areas of physical chemistry, focusing on areas where IUPAC could contribute significantly. No

decisions on these matters were made in Berlin. The newly elected Division Committee is scheduled to meet around the beginning of March 2000 to continue the discussions and make decisions that will determine how the Physical Chemistry Division will function in the future.

The status of the projects of the Division is good. Of the 55 projects listed in the *IUPAC Handbook 1998–1999*, 16 had been completed by 1999, 4 had been closed, and 30 were expected to be completed by 2001, leaving only 5 that may need to continue (after being reconsidered) under the new organization. New projects have been proposed, and the Division Committee will discuss them during the spring meeting and decide how these proposals should be managed. The question "Why IUPAC?" will be important when discussing future projects.

Gerd Olofsson
Secretary, IUPAC Physical Chemistry Division Committee I.0

Commission on Molecular Structure and Spectroscopy (I.5)

Summary of Minutes of Commission Meeting at IUPAC General Assembly, Berlin, Germany, 8–10 August 1999

Thirteen members of the Commission on Molecular Structure and Spectroscopy (I.5), including national representatives and observers, met for three days during the 40th General Assembly at die Freie Universität, Berlin, Dahlem. Two new titular members, Profs. R. McDowell and N. Hirota, and two new associatie members, Profs. P. v. R. Schleyer and Quing-Shi Zhu, were introduced.

Four projects were completed, and three of these were published in *Pure and Applied Chemistry (PAC)*: J. E. Bertie**,** Specification of Components, Methods, and Parameters in Fourier Transform Spectroscopy by Michelson and Related Interferometers, *PAC,* **70**, 2039–2045 (1998), which will also be published in the *Australian Journal of Chemistry*; R. K. Harris, J. Kowalewski, and S. Cabral de Menezes, Parameters and Symbols for Use in Nuclear Magnetic Resonance, *PAC,* **69**, 2489–2495 (1997), which has also been published in two journals devoted to NMR spectroscopy; and J. E. Boggs, Guidelines for the Presentation of Methodological Choices in the Publication of Computational Results, Part A. Ab Initio Electronic Structure Calculations, *PAC,* **70**, 1015–1018 (1998). One article was approved by the Commission: J. J. P. Stewart, Guidelines for the Presentation of Methodological Choices in the Publication of Computational Results, B. Semiempirical Electronic Structure Calculations, to be submitted to *PAC*. The following book has been published: *Nonlinear Spectroscopy for Molecular Structure Determination* (editors: R. W. Field, E. Hirota, J. P. Maier, and S. Tsuchiya), 276 pages, Blackwell Science, Oxford, 1998.

Other projects are close to completion: R. S. McDowell, J. E. Bertie, P. R. Bunker, J.-M. H. Flaud, J. T. Hougen, P. Rosmus, J. K. G. Watson, and B. P. Winnewisser, "Notations and Conventions in Molecular Spectroscopy: Part 4. Rotation-Vibration Spectroscopy", which, after minor changes, will be submitted to *PAC*; R. K. Harris, E. Becker, W. Bremser, S. Cabral de Menezes, R. Goodfellow, and P. Granger, "Provisional Recommendations for NMR Nomenclature, Nuclear Spin Properties, and Conventions for Chemical Shifts", which is nearly finished and will be submitted to *PAC* and possibly to other NMR journals; and R. Janoschek, "The Computation of Experimental Structure and Properties of Small Molecules by Ab Initio Calculations", which is a comprehensive work of about 100 pages that will, after completion, be submitted to a specialized journal.

An extensive report of about 220 pages on high-pressure spectroscopy by A. M. Heyns, D. M. Adams, W. B. Holzapfel, M. N. Nicol, and Ph. Pruzan, *Spectroscopy under Extreme Conditions of Pressure and Temperature,* will, it is hoped, be completed in the near future, possibly to be published as a book. A preliminary report by M. Terazima and N. Hirota, *Quantities, Terminology, and Symbols in Photothermal and Related Spectroscopies*, was presented; it is hoped that the work will be completed in 2001. The project of J. E. Boggs, "Guidelines for the Presentation of Methodological Choices in the Publication of Computational Results, C. Molecular Mechanics Calculations", has been delayed because of slow cooperation with Commission I.7.

Joint meetings were held between Commission I.5 and Commissions V.4 and I.1. With Commission V.4, the pending projects of each commission were reported, and various projects of common interest were discussed. Additions and alterations that should be included in the next edition of the "Green Book" (*Quantities, Units, and Symbols in Physical Chemistry*) were discussed with Commission I.1.

It is a general belief among the members of Commission I.5 that the new organization of IUPAC after 2001 will have a negative influence on the future scientific activity of IUPAC, leading to more political and less scientific activity.

The chairman, John E. Bertie, thanked the members for their contributions to the work of Commission I.5.

Peter Klaeboe
Secretary, IUPAC Commission on Molecular Structure and Spectroscopy I.5

Commission on Physical Organic Chemistry (III.2)

Summary of Minutes of Commission Meeting at IUPAC General Assembly, Berlin, Germany, 8–10 August 1999

Because IUPAC future activities will be exclusively based on projects, the Commission has devoted most of its time to examination of the status of ongoing projects and to the discussion of proposals for new projects. The Commission was pleased to see that the projects "Guidelines for publication of research results from force-field calculations", "Critical compilation of scales of medium effects", and "Glossary of terms used in theoretical organic chemistry" have all been completed, and that the first two have already been published in *PAC*. It was noted, however, that further work is still necessary to complete the *Glossary of Terms in Supramolecular Chemistry.* Very sensitive to environmental problems, the Commission has given particular attention to the ongoing project on Green Chemistry**,** led by Prof. Tundo, for which a Working Party had already been established.

A White Book on Green Chemistry will be produced soon containing a Symposium-in-Print, organized in collaboration with the Subcommittee on Organic Synthesis of the Division of Organic Chemistry. This project was also examined in a joint meeting of the Commission with the project Working Party and Division VI (Chemistry and the Environment), which was also attended by the IUPAC Secretary General, Dr. E. D. Becker. The project, which is in line with almost all of IUPAC's goals, was fully endorsed by the Commission, and Division VI promised all possible support.

In the same area, a new project concerning environmental degradation of organic compounds was proposed by Prof. Nudelman. The aim of the project is the evaluation of available chemical information on the chemical and photochemical fate of organic pollutants in the environment. The project was considered interesting, but too broad. It was suggested that the project should be better defined before presentation.

In the field of education, the Commission has dedicated an entire meeting to the discussion of the project for an international organic chemistry curriculum proposed by Prof. Nudelman. Profs. Takeuchi and Bradley of the Committee on Teaching of Chemistry (CTC) also attended this meeting. The aim of this project is to establish updated organic chemistry curricula, which should facilitate exchange of students and transferability of courses and curricula. The project was considered very useful and received the support of the Commission; however, in order to be approved by IUPAC, some goals of the project should be revised in the light of the criticism expressed by the CTC and the Division of Organic Chemistry.

Prof. Abboud's proposal for a new project "Critical compilation of hydrogen bonding acidity and basicity scales for solutes" was discussed and fully endorsed. The possibility of undertaking projects in the near future concerning the second part of the "Critical compilation of scales of solvent parameters: Materials", "Strength of strong acids", and a "Bioorganic glossary" was also discussed.

A joint meeting with the Commission on Photochemistry (III.3) also took place, during which the two Commissions exchanged information concerning their respective ongoing projects and future plans in the light of the forthcoming restructuring of IUPAC.

The next meeting of the Commission will take place in connection with the 15th IUPAC Conference on Physical Organic Chemistry (Göteborg, Sweden, 8–13 July 2000).

Charles L. Perrin
Chairman, IUPAC Commission on Physical Organic Chemistry III.2

Enrico Baciocchi
Secretary, IUPAC Commission on Physical Organic Chemistry III.2

Commission on Macromolecular Nomenclature (IV.1)

Summary of Minutes of Commission Meeting at IUPAC General Assembly, Berlin, Germany, 7–11 August 1999

The meeting was attended by all Titular Members, six Associate Members, three National Representatives, ten consultants, correspondents and observers, and the Division Chairman and Secretary.

At the date of the meeting, the Commission had thirteen projects underway. Two were open for public review (18/87, "Liquid crystals" and 19/89, "Regular single-strand nomenclature"), two more were expected to be submitted to IDCNS and public review before the end of March of 2000 (21/92, "Source-based generic nomenclature" and 25/95, "Asymmetric polymerization"), and the remaining nine were in various stages of development for further consideration during the Warsaw 2000 meeting. The Commission also had nine feasibility studies in progress, two of which became projects (32/99, "Terminology of ion-containing polymers" and 33/99, "Source-based nomenclature for modified polymer molecules"), while the other seven moved closer to becoming projects during the Warsaw meeting.

The Commission also reviewed other activities, including a comprehensive list of terms, the 2nd edition of the "Purple Book", and a history of the Commission since its creation.

In preparation for discussion of the IUPAC restructuring project at the Division level, the project was examined in considerable detail. The main concern expressed by all members was the possible loss of continuity, considered essential in nomenclature work. Therefore, it was unanimously resolved to support the continuation of this Commission in its present form.

Maximo Baron
Secretary, IUPAC Commission on Macromolecular Nomenclature IV.1

Commission on Agrochemicals and the Environment (VI.4)

Summary of Minutes of Commission Meeting at IUPAC General Assembly, Berlin, Germany, 8–10 August 1999

Twenty-one members of the Commission on Agrochemicals and the Environment (VI.4) met for three days during the General Assembly in Berlin. Meetings for the next three years will be in Taichung (2000) in association with a workshop, Brisbane (2001), and Basel (2002).

The Commission discussed fourteen projects at various stages from proposed to completed and ready for publication. It is current practice for the whole Commission to review the recommendations from each project before publication. It is not clear who will have this role once the commissions disappear. The recommendations could hardly be IUPAC recommendations if they are sent for external review because the expertise will no longer reside in IUPAC.

Extended summaries of reports, previously published in *Pure and Applied Chemistry,* have been published in *Pesticide Science.* The Commission web site is running, with full copies of recent papers from *Pure and Applied Chemistry* and *Chemistry International* available. An active *Glossary of Terms* has been established.

Denis Hamilton
Secretary, IUPAC Commission on Agrochemicals and the Environment VI.4

Commission on Nomenclature, Properties, and Units (C-NPU) (VII.C.1)

Summary of Minutes of Commission Meeting at IUPAC General Assembly, Berlin, Germany, 8–10 August 1999

The main focus of this meeting was on harmonization of current projects of this commission with the new structure being implemented by the Union. Most of the ongoing projects will be finished during this biennium; however, some of them, like the C-NPU Internet web site, which is a core project for this Commission, are ongoing activities. The Commission brought this point to the attention of the Division during the Division meeting in Berlin.

It is a clear commitment of the C-NPU to participate actively in the new projects proposed for the Chemistry and Human Health Division, contributing to the nomenclature, according to the interdisciplinary character of these broad projects. A new interdivisional project was proposed on the use of the NPU concept system for properties in the field of environmental chemistry. The project will be prepared by the collaborative effort of the two divisions, including A. Kallner, J. H. Duffus, and W. R. Külpmann.

The composition of the C-NPU for the biennium 2000–2001 will be as follows:

Titular Members (TMs): Urban Forsum (Chairman), Pedro Soares de Araujo (Secretary), Antonin Jabor, Wolf R. Külpmann, and Gunnar Nordin. There is still one open position for TM, and a candidate will be proposed after further consultation.

Associate Members (AMs): Xavier Fuentes-Arderiu, J. Gilbert Hill, Desmond Kenny, Eugeny V. Yurtov, Henrik Olesen, and René Dybkaer.

It was agreed that C-NPU would meet twice a year during the 2000–2001 biennium in order to maintain its current productivity.

Pedro Soares de Araujo
Secretary, IUPAC Commission on Nomenclature, Properties, and Units VII.C.1

Provisional Recommendations

IUPAC Seeks Your Comments

In this section, we publish synopses of IUPAC's latest provisional recommendations on nomenclature and symbols. All comments on these recommendations are welcome and will be taken into consideration. The final revised versions are published in *Pure and Applied Chemistry*, and synopses of these are published in *Chemistry International* as recent reports.

If you would like to comment on the provisional recommendations, please write to your nearest national/regional center to request a copy of the full report. Copies are not available from the IUPAC Secretariat. The most recent list of national/regional centers appeared in *Chemistry International* 1997, **17**, 141. This information is also available on the IUPAC web site: http://www.iupac.org/.

Physical Chemistry Division. Commission on Colloid and Surface Chemistry Including Catalysis—Nomenclature of Structural and Compositional Characteristics of Ordered Microporous and Mesoporous Materials with Inorganic Hosts

A system of terms applicable to ordered microporous and mesoporous materials is proposed, and rules for writing a standardized crystal chemical formula for such materials are presented. The recommendations are based both on common usage and on a systematic classification scheme. The nomenclature has been developed to encompass all inorganic materials with ordered, accessible pores with free diameters of less than 100 nm. The crystal chemical formula describes the chemical composition of both the guest species and the host, the structure of the host, the structure of the pore system, and the symmetry of the material. This formula can be simplified or expanded to suit the user's requirements.

Comments by 31 October 2000 to Dr. Lynne B. McCusker, Laboratorium für Kristallographie, ETH-Zentrum, CH-8092 Zürich, Switzerland. Tel.: +41 1 632 3721, Fax: +41 1 632 1133, E-mail: Lynne.McCusker@kristall.erdw.ethz.ch.

Conference Announcements

3rd Biennial International Conference on Chemical Measurement and Monitoring of the Environment (EnviroAnalysis 2000), 8–11 May 2000, Ottawa, Ontario, Canada

For information, contact Conference Secretariat, Carleton University, Chemistry Department, 1125 Colonel By Dr., Ottawa, ON K1S 5B6 Canada; Fax: +1 613 520 3679; Web site: http://www.carleton.ca/~rburk/ea2000/.

Dietary Fibre 2000 (Sponsored by ICC/AOAC International), 14–17 May 2000, Dublin, Ireland

For information, contact Angela Kennedy (Conference Secretariat), Megazyme International (Ireland) Limited, Bray Business Park, Bray, Co. Wicklow, Ireland; E-mail: angela@megazyme.com; Fax: +353 1 286 1264.

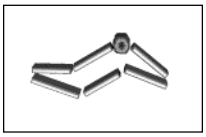
9th International Symposium on Luminescence Spectrometry in Biomedical and Environmental Analysis—Spectroscopic and Imaging Detection Techniques, 15–17 May 2000, Montpellier, France

For information, contact Prof. Dr. Dan A. Lerner, University of Montpellier Ecole Nationale Supérieure de Chimie 8, Rue de l'Ecole Normale, F-34296 Montpellier Cedex 5, France; E-mail: lerner@enscm.fr; Tel.: +33 04 67144323; Fax: +33 04 67144349.

30th Annual International Symposium on Environmental Analytical Chemistry (30th ISEAC), 13–16 June 2000, Espoo, Finland

For information, contact M. Frei-Hayusler, P.O. Box 46, CH-4123 Allschwil 2, Switzerland; E-mail: iaeacmfrei@access.ch; Tel.: +41 61 481 27 89; Fax: +41 61 482 08 05.

6th European Training Course on Carbohydrates, 8–14 July 2000, Debrecen, Hungary



This course provides an introduction to modern principles, tools, and trends of carbohydrate chemistry and technology. Participants need a higher education in chemistry or a related discipline, e.g., biochemistry, chemical technology, or food science.

The program will include sessions on analysis ("Methods in structural analysis of carbohydrates I and II"); synthesis ("Glycosylation reactions: principles and illustrations", "Synthesis of bioactive oligosaccharides and glycoconjugates", "Combinatorial chemistry of carbohydrates", and "Saccharide engineering: *in vivo* and *in vitro* use of enzymes"); structure—function ("Structure and function of glycoconjugates", "Physicochemical properties of polymers", "Molecular organization in polysaccharide assemblies", and "Molecular modeling of oligosaccharides, polysaccharides, and protein–carbohydrate interactions"); and industrial applications ("Cyclodextrins: From scientific curiosity to thousand-ton scale production"; "Cellulose and cellulose derivatives—molecular and supramolecular structure design"; "Starch and modified starches: Production, structure, properties, and application"; and "Bacterial polysaccharides"). There will also be workshops on renewable raw materials and on nomenclature of carbohydrates. Special topics seminars will include "Wonders in wine: chemistry and art", "Carbohydrates in cyber space", "Physiological effects of structurally different oligosaccharides", "Sugar-derived building blocks for the synthesis of noncarbohydrate natural products", "Medical application of antibiotics containing carbohydrates", and "Cell wall polysaccharides: Key components in food processing".

The social program will include a working excursion to the Rakoczi vineyard in Tokaj in the northeastern corner of Hungary, an organ concert in the Church of Debrecen, and a restaurant dinner.

A limited number of grants for free participation will be made available to selected candidates.

For more information, contact Carbohydrate Research Foundation, c/o Ms. Ellen Jansen (Zestec), P.O. Box 96882, 2509 JG, the Hague, Netherlands; E-mail: crf@zestec.com; Tel.: +31 70 3544 09 82; Fax: +31 70 351 53 18; Web site: http://www.zestec.com/crf/tc/6/.

6th Polish Conference on Analytical Chemistry, 9–14 July 2000, Gliwice, Poland

For information, contact 6th Polish Conference on Analytical Chemistry, Silesian Technical University, Department of Analytical and General Chemistry, Faculty of Chemistry, ul. M. Strzody 9, 44-100 Gliwice, Poland; E-mail: analityk@zeus.ppolsl.gliwice.pl; Tel./Fax: +48 32 237 12 05; Web site: http://www.polsl.gliwice.pl\~analityk/.

Food BioPack Conference: Production and Application of Biobased Packaging Materials for the Food Industry, 27–29 August 2000, Copenhagen, Denmark

This conference, organized under the auspices of the European Union (EU), will cover a wide range of subjects related to biobased/biodegradable packaging materials, including food applications, origin of resources, performance and properties, biodegradability/compostability, food quality and safety aspects, edible coatings and films, disposal, consumer aspects, and marketing. The conference will take place at the Royal Veterinary and Agricultural University in Copenhagen. Its proceedings will result in a state-of-the-art report addressed to the food and packaging industries, retailers, legislative authorities, and academia.

For more information, contact Dr. Claus Weber, Department of Dairy and Food Science, Royal Veterinary and Agricultural University, Rolighedsveg 30, DK-1958 Frederiksberg C, Denmark; E-mail: clj@kvl.dk; Tel.: +45 3528 3249; Fax: +45 3528 3245; Web site: http://www.mli.kvl.dk/foodchem/special/biopack/.

CODATA Molten Salt Working Group Workshop on Building Information on Molten Salts, 18–20 September 2000, Marseille to Corsica, France

The goal of this first workshop of CODATA's new Working Group on Molten Salts is to discuss barriers to and propose solutions for bringing together the vast amount of data in the molten salt literature into a "Virtual Molten Salt Data Laboratory".

The workshop will consist of individual presentations and panel discussions. Principal issues will be the large amount of data available in the literature and the effective use of the Internet to link together the differ-

ent communities of data generators and data users. Following completion of the workshop, a summary of the proceedings will be posted on the Internet, and a working model will be proposed for creation of a centralized data laboratory.

Molten salts are high-temperature liquids widely used in a number of industrial applications, including:

- elaboration (electrodeposition of metals, synthesis of materials, etc.)
- energy (fuel cells, batteries, thermal storage, etc.)
- environment (waste processing, recycling, etc.)
- nuclear industry (recycling of spent fuel, etc.)
- lighting industry

Other topics to be addressed include the following:

- What community action, if any, is needed to retrieve the older data, both in the open and "grey" literature?
- What databases exist currently, and are there gaps that need to be filled?
- What additional standards are needed to facilitate the building of a "Virtual Molten Salt Data Laboratory"? Delivery? Integration?
- What actions are needed to sustain the molten salt data community, especially as the World Wide Web promotes individual actions?

The workshop will take place partly in Marseille (one-half day) and mostly aboard the *Napoleon Bonaparte*, a luxury ferry linking Marseille to Corsica, with all conference facilities aboard.

For further information, contact Marcelle Gaune-Escard (mge@iusti.univ-mrs.fr), Joan Fuller (joan.fuller@nist.gov), or the Workshop Secretariat, c/o Joyce Bartolini, IUSTI, Technopole de Chateau Gombert, 5 Rue Enrico Fermi, F-13453 Marseille Cedex 13, France; E-mail: molten.salts@iusti.univ-mrs.fr; Tel.: + 33 (0) 4 91 68 82; Fax: +33 (0) 4 11 74 39.

AOCS/JOCS Joint Meeting 2000, 22–27 October 2000, Kyoto, Japan

For information, contact American Oil Chemists Society (AOCS) Meetings and Exhibits Department, P.O. Box 3489, Champaign, IL 61826-3489, USA; E-mail: meetings@aocs.org; Tel.: +1 217 359 2344; Fax: +1 217 351 8091.

Conference Calendar

Visit http://www.iupac.org for complete information and further links.

NEW *designates a new conference since the last issue.*

2000

Mycotoxins and Phycotoxins

21–25 May 2000
10th International IUPAC Symposium on Mycotoxins and Phycotoxins, Guarujá, São Paulo, Brazil.
Complete Events & Associates, Rua Joaquim Antunes, 490 - 8º - 82 05415-001 São Paulo, Brazil.
Tel.: +55 (11) 3068 8783
Fax: +55 (11) 3061 0780
E-mail: mycbr2000@complete.com.br

Polymer-Based Technology

21–26 May 2000
9th International Conference on Polymer-Based Technology (POC'2000), Tianjin, China.
Prof. Zhang Zhengpu
Institute of Polymer Chemistry
Nankai University
94 Weijin Road
Tianjin 300071, China.
Tel.: +86 22 2350 1386
Fax: +86 22 2350 4853
E-mail: zhangzp@sun.nankai.edu.cn

Flow Analysis

25–29 June 2000
8th International Conference on Flow Analysis, Warsaw, Poland.
Prof. Marek Trojanowicz, Department of Chemistry, University of Warsaw, Pasteura 1, 02-093 Warsaw, Poland.
Tel/Fax: +48 22 822 35 32
E-mail: trojan@chem.uw.edu.pl

Organic Synthesis

1–5 July 2000
13th International Conference on Organic Synthesis (ICOS-13), Warsaw, Poland.
Prof. M. Makosza, Institute of Organic Chemistry, Kasprzaka 44, 01-224 Warsaw 42, P.O. Box 58, Poland.
Tel.: +48 22 631 8788
Fax: +48 22 632 6681
E-mail: icho-s@ichf.edu.pl

Chemical Sensors

3–5 July 2000
8th International Meeting on Chemical Sensors (ES-IMCS'2000), Basel, Switzerland.
This conference has declined IUPAC sponsorship.

Physical Organic Chemistry

8–13 July 2000
15th International Conference on Physical Organic Chemistry (ICPOC 15), Göteborg, Sweden.
Prof. P. Ahlberg, Organic Chemistry, Department of Chemistry, Göteborg University, SE-412 96, Göteborg, Sweden.
Tel.: +46 31 7722900
Fax: + 46 31 7723843
E-mail: Per.Ahlberg@oc.chalmers.se

Macromolecules

9–14 July 2000
38th International Symposium on Macromolecules (MACRO 2000), Warsaw/Łódz, Poland.
Prof. Stanislaw Penczek, Polish Academy of Sciences, ul. Sienkiewicza 112, 90363 Łódz, Poland.
Tel.: +48 42 81 9815
Fax: +48 42 684 7126
E-mail: spenczek@bilbo.cbmm.lodz.pl

Coordination Chemistry

9–14 July 2000
34th International Conference on Coordination Chemistry (34-ICCC), Edinburgh, Scotland.
Prof. P. Tasker, Chairman
Dr. John F. Gibson, Secretary
The Royal Society of Chemistry, Burlington House, London W1V OBN, UK.
Tel.: +44 171 440 3321
Fax: +44 171 734 1227
E-mail: gibsonj@rsc.org

Polymers in Medicine

17–20 July 2000
40th Microsymposium on Polymers in Medicine, Prague, Czech Republic.
Dr. Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Science of the Czech Republic, Heyrovskeho nam. 2, 162 06 Praha 6, Czech Republic.
Tel.: +420 2360341
Fax: +420 2367981
E-mail: sympo@imc.cas.cz

Polymer Networks '2000

17–21 July 2000
15th Polymer Networks Group Meeting "Polymer Networks '2000", Cracow, Poland.
Prof. H. Galina, Rzeszow University of Technology, Faculty of Chemistry, W. Pola Str.2, PL 35-959 Rzeszow, Poland.
Tel.: +48 17 628 057
Fax: +48 17 854 3655
E-mail: hgal@prz.rzeszow

Photochemistry

22–27 July 2000
18th IUPAC Symposium on Photochemistry, "Photochemistry into the New Century", Dresden, Germany.
Prof. Dr. Silvia E. Braslavsky, Max-Planck Institut für Strahlenchemie, Postfach 101365, D-45413 Mülheim an der Ruhr, Germany.
Tel: +49 (208) 306 3681
Fax: +49 (208) 306 3951
E-mail: braslavskys@mpi-muelheim.mpg.de

Organometallic Chemistry

23–28 July 2000
19th International Conference on Organometallic Chemistry (XIX ICOMC), Shanghai, China.
Profs. Li Xin Dai and Chang Tao Qian, Chairmen, Prof. Xue Long Hou, Secretary, Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, 354 Fenglin Road, Shanghai 200032, PR, China,
Tel.: +86 21 641 63300
Fax: +86 21 641 66128
E-mail: xlhou@pub.sioc.ac.cn

Solubility Phenomena

25–28 July 2000
9th International Symposium on Solubility Phenomena (9th ISSP), Hammamet, Tunisia.
Prof. Najia Kbir-Ariguib, National Institute for Scientific and Technical Research, P.O. Box 95, Hammam-Lif, 2050 Tunisia.
Tel: +216 1 430 215
Fax: +216 1 430 934
E-mail: ariguib@planet.tn

Chemical Education

5–10 August 2000
16th International Conference on Chemical Education: Chemistry for a Healthier Planet (16 ICCE), Budapest, Hungary.
Prof. Alajos Kalman, Chairman, Prof. Gabor Naray-Szabo, Department of Theoretical Chemistry, Lorand Eotvos University, Pazmany Peter st. 1b, H-1117 Budapest, Hungary.
Tel.: +36 1 209 0555, ext. 16-30
Fax: +36 1 209 0602
E-mail: mail2.mke@mtesz.hu

Chemical Thermodynamics

6–11 August 2000
16th IUPAC Conference on Chemical Thermodynamics, Halifax, Nova Scotia, Canada.
Prof. M. A. White, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia B3H 4J3, Canada.
Tel.: +1 902 494 3894
Fax: +1 902 494 1310
E-mail: Mary.Anne.White@DAL.CA

How to Apply for IUPAC Sponsorship

To apply for IUPAC sponsorship, conference organizers should complete an Advance Information Questionnaire (AIQ). The AIQ form is available at http://www.iupac.org or by request at the IUPAC Secretariat, and should be returned between 2 years and 12 months before the conference. Further information on granting sponsorship is included in the AIQ and available online.

Thermal Analysis and Calorimetry

14–18 August 2000
12th International Congress on Thermal Analysis and Calorimetry, Copenhagen, Denmark.
Dr. O. Toft Sorensen, Materials Research Department, Riso National Laboratory DK-4000, Roskilde, Denmark.
Tel: +45 4677 5800
Fax: +45 4677 5758
E-mail: o.toft.sorensen@risoe.dk

Chemical Sensors

27–30 August 2000
EUROSENSORS XIV, the 14th European Conference on Solid-State Transducers, Copenhagen Denmark.
This conference has declined IUPAC sponsorship.

Biotechnology

3–8 September 2000
11th International Biotechnology Symposium, Berlin, Germany.
Prof. G. Kreysa, DECHEMA e.V.— c/o 11th IBS, Theodor-Heuss-Allee 25, 60486 Frankfurt/Main, Germany.
Tel.: +49 69 7564 235 / -249
Fax: +49 69 7564 176 / -304
E-mail: biotechnology2000@dechema.de

Nuclear and Radiochemistry

3–8 September 2000
5th International Conference on Nuclear and Radiochemistry (NRC5), Pontresina, Switzerland.
Prof. H. W. Gäggeler, Chairman, Mrs. R. Lorenzen, Secretary, Paul Scherrer Institut, CH-5232 Villigen-Ost, Switzerland.
Tel.: +41 56 310 2401
Fax: +41 56 310 4435
E-mail: ruth.lorenzen@psi.ch

Analytical Chemistry

3–9 September 2000
EUROANALYSIS XI, Lisboa, Portugal.
Prof. Maria Filomena Camões, Chair, Dr. Cristina Oliveira, Secretary, Departamento de Química e Bioquímica, Faculdade de Ciências, Universidade de Lisboa, Edifício C1-5º Piso, P-1700 Lisboa, Portugal.
Tel.: +351 1 3906138
Fax: +351 1 3909352; 7500088
E-mail: euroanalysisxi@fc.ul.pt

Natural Products

4–8 September 2000
22nd International Symposium on the Chemistry of Natural Products, São Carlos, São Paulo, Brazil.
Dr. M. Fátima das G.F. da Silva, Universidade Federal de São Carlos, Depto. de Química, Via Washington Luiz, km 235, CP676, São Carlos, São Paulo, Brazil.
Tel.: +55 16 260 8208
Fax: +55 16 260 8350
E-mail: dmfs@power.ufscar.br

Medicinal Chemistry

18–22 September 2000
XVI International Symposium on Medicinal Chemistry, Bologna, Italy.
Prof. C. Melchiorre, Universitá di Bologna, Dipartimento di Scienze Farmaceutiche, Via Belmeloro 6, I-40126 Bologna, Italy.
Tel.: +39 051 259 706
Fax: +39 051 259 734
E-mail: camelch@alma.unibo.it

Trace Elements in Food

9–11 October 2000
Warsaw, Poland.
Prof. B. Szteke, Chairman, Dr. R. Jedrzejczak, Secretary, Institute of Agricultural and Food Biotechnology
ul. Rakowiecka 36
02-532 Warsaw, Poland.
Tel.: +48 22 606 3876
Fax: +48 22 4904 28
E-mail: jedrzejczak@ibprs.waw.pl

Food Packaging

8–10 November 2000
2nd International Symposium on Food Packaging—Ensuring the Safety and Quality Food, Vienna, Austria.
Liên-Anh Tran, ILSI Europe, 83, Avenue E. Mounier, Box 6, B-1200, Brussels, Belgium.
Tel.: +32 (2) 771 0014
Fax: +32 (2) 762 0044
E-mail: anh@ilsieurope.be

Polymers

20–24 November 2000
7th Latin-American Symposium on Polymers (SLAP'2000) and 5th Ibero American Congress on Polymers, Havana, Cuba.
Dr. Ricardo Martínez, Dr. Waldo Argüelles-Monal, IMRE, Universidad de La Habana
La Habana 10400, Cuba.
Fax: +53 7 33 42 47
E-mail: slap@imre.oc.uh.cu

2001

Polymer Characterization

9–12 January 2001 **NEW**
9th International Conference on Polymer Characterization (POLYCHAR), Denton, Texas, USA.
Dr. Witold Brostow, Department of Materials Science, University of North Texas, Denton, Texas, 76203-5310 USA.
Tel.: + 1 940 565 4358, -3262, or 4337
Fax: +1 940 565 4824

E-mail: brostow@unt.edu or polychar@marta.phys.unt.edu

Chemistry and Chemical Engineering

16–20 April 2001
IV International Congress on Chemistry and XIII Caribbean Conference on Chemistry and Chemical Engineering, Havana, Cuba.
Prof. Alberto J. Núñez Sellés, Sociedad Cubana de Química, Ave 21&200, Atabey, Apdo. 16042, CP 11600, Havana, Cuba.
Tel.: +537 218 178
Fax: +537 336 471
E-mail: cqf@infomed.sld.cu

CHEMRAWN XIV

9–13 June 2001
Chemrawn Conference—Toward Environmentally Benign Processes and Products,
Boulder, Colorado, USA.
Dr. Dennis L. Hjeresen, Environmental Management Program, Los Alamos National Laboratory - Mail Stop J591, Los Alamos, NM 87545.
Tel.: +1 505 665 7251
Fax: + 1 505 665 8118
E-mail: dennish@lanl.gov

IUPAC 41st General Assembly

29 June–8 July 2001
Brisbane, Australia.
IUPAC Secretariat.
Tel.: +1 919 485 8700
Fax: +1 919 485 8706
E-mail: secretariat@iupac.org

IUPAC 38th Congress / World Chemistry Congress 2001

1–5 July 2001
Brisbane, Australia.
Congress Secretariat, P.O. Box 177, Red Hill Q 4054, Australia.
Tel.: + 61 7 3368 2644
Fax: + 61 7 3369 3731
E-mail: wcc2001@ccm.com.au

Coordination and Organometallic Chemistry of Germanium, Tin, and Lead NEW

8–12 July 2001
10th International Conference on the Coordination and Organometallic Chemistry of Germanium, Tin, and Lead, Talence, France.
Dr. B. Jousseaume, Laboratoire de Chimie Organique et Organometallique, UMR 5802, Universite Bordeaux 1, 351 avenue de la Liberation, F-33405 Talence Cedex, France.
Tel.: +33 (0) 5 56 84 64 43
Fax: +33 (0) 5 59 84 69 94
E-mail: b.jousseaume@lcoo.u-bordeaux.fr

Scattering Methods and Polymers

9–12 July 2001
20th Discussion Conference on Scattering Methods for the Investigation of Polymers,
Prague, Czech Republic.
Dr. Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovskeho nam. 2, CZ-162 06 Praha 6, Czech Republic.
Tel.: +420 2 204 0332
Fax: +420 2 367 981
E-mail: sympo@imc.cas.cz

Polymer Membranes

16–19 July 2001
41st Microsymposium on Polymer Membranes,
Prague, Czech Republic.
Dr. Jaromir Lukas, Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovskeho nam. 2, CZ-162 06 Praha 6, Czech Republic.
Tel.: +420 2 204 03332
Fax: +420 2 367 981
E-mail: sympo@imc.cas.cz

Visas

It is a condition of sponsorship 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.

Phosphorus Chemistry

29 July–3 August 2001
15th International Conference on Phosphorus Chemistry, Sendai, Japan.
Prof. Masaaki Yoshifuji, Department of Chemistry, Graduate School of Science,Tohoku University, Aoba, Sendai 980-8578, Japan.
Tel.: +81 22 217 6558
Fax: +81 22 217 6562
E-mail: yoshifj@mail.cc.tohoku.ac.jp

Analytical Sciences

6–10 August 2001
International Congress on Analytical Sciences 2001 (ICAS2001), Tokyo, Japan.
Prof. Tsuguo Sawada, Chairman, Department of Applied Chemistry, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Toyko 113-8656, Japan.
Tel.: +81 3 5841 7236 (or 7237)
Fax: +81 3 5841 6037
E-mail: icas2001@laser.t.u-tokyo.ac.jp

Biodiversity

3–8 November 2001
3rd IUPAC International Conference on Biodiversity (ICOB-3), Antalya, Turkey.
Prof. B. Sener, Department of Phamocognosy, Faculty of Pharmacy, Gazi University, P.O. Box 143 06572, Maltepe-Ankara, Turkey.
Tel.: +90 312 212 2267
Fax: +90 312 213 3921
E-mail: blgsener@tr-net.net.tr

Sweeteners

13–17 November 2001
2nd International Symposium on Sweeteners, Hiroshima-Shi, Japan.
Prof. Kasuo Yamasaki, Institute of Pharmaceutical Sciences, Faculty of Medicine, Hiroshima University Kasumi, Minami-ku, Hiroshima 734-8551, Japan.
Tel.: +81 82 257 5285
Fax: +81 82 257 5289
E-mail: yamasaki@pharm.hiroshima-u.ac.jp

2002

Polymer Characterization NEW

7–11 January 2002
10th International Conference on Polymer Characterization (POLYCHAR), Denton, Texas, USA.
Dr. Witold Brostow, Department of Materials Science, University of North Texas, Denton, Texas, 76203-5310 USA
Tel.: + 1 940 565 4358, -3262, or 4337
Fax: +1 940 565 4824
E-mail: brostow@unt.edu or polychar@marta.phys.unt.edu

Bioorganic Chemistry NEW

12–15 May 2002
6th International Symposium on Bioorganic Chemistry, Toronto, Canada.
Dr. Ronald Kluger, Department of Chemistry, University of Toronto, Toronto,Canada M5S 3H6.
Tel.: +1 416 978 3582
Fax.: +1 416 978 3482
E-mail: rkluger@chem.utoronto.ca

Polymer Science and Technology NEW

2–5 December 2002
IUPAC Polymer Conference on the Mission and Challenges of Polymer Science and Technology, Kyoto, Japan.
Prof. Seiichi Nakahama, Faculty of Engineering, Tokyo Institute of Technology, 2-12-1 Ohokayama, Meguro-ku, Tokyo 152-8552, Japan.
Tel.: +81 3 5734 2138
Fax.: +81 3 5734 2887
E-mail: snakaham@polymer.titech.ac.jp