Report of the Projects Group of CCE for the Glasgow Meeting during the 45th IUPAC GA in August 1-6, 2009

July 22, 2009

Prepared by Choon H. Do (Korea) – Project Coordinator
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Contents:

- Previous Report: submitted at the CCE Meeting during the 20th ICCE in August 2008.

1. Membership of the Project Group

Prof. Choon H. Do (Korea) – Project Coordinator (choondo@sunchon.ac.kr)
Prof. Morton Z. Hoffman (USA)
Prof. Mei-Hung Chiu (Taiwan)
Prof. A. James McQuillan (New Zealand)
Prof. Masahiro Kamata (Japan)
Prof. Kristina Edström (Sweden)

2. Review Procedure of Proposals in IUPAC

Step 1. Receipt at the Secretariat
Step 2. Internal evaluation and identification of outside reviewers
Step 3. Distribution to the outside reviewers and gathering of the reviews
Step 4. Communication of the reviews to the Division(s) or Standing Committee(s) for final decision or recommendation to the Project Committee
Step 5. Consideration and action by the Project Committee (when applicable)
Step 6. Notification of IUPAC's decision to the submitter
Step 7. Responsibility for project management

Review Procedure of Proposals in the Project Group, CCE (Step 2 in above)

Step: 1. FM (Dr. Fabienne Mayer) send the proposals to the members of Project Group.
Step 2. Each member sends his (her) opinion to FM
Step 3. FM send the opinion of the members to Project Coordinator.(PC)
Step 4. PC summarize and and send the collective opinion to Chairman of CCE and FM

3. Project Budget

USD 20,000 per two years

4. Current Projects
4.1. CCE Projects

(1) Project No.: 2008-043-1-050
Title: Visulaizing and understanding the science of climate change
Chair: Prof. Peter Mahaffy
Members: Chiu, Mei-Hung; Engida, Temechegn; Hasler, Julia; Kirchhoff, Mary; Martin, Brian; Osborne, Colin; Tarasova, Natalia P.
Date submitted: 07-Dec-2008
Start: 01-Feb-2009
Budget in USD:

(2) **Project No**: 2008-042-1
Title: Development of a framework of priorities for IUPAC Committee on Chemistry Education
Chair: Dr. Tony Ashmore
Members: Akesson, Eva; Chiu, Mei-Hung; Kirchhoff, Mary; Lamba, Ram S.
Date submitted: 13-Nov-2008
Start: 01-May-2009
Budget in USD 7,880

(3) Project No: 2007-005-2-050 (Reported at Mauritius meeting in Aug, 2008)
Title: Research-based evaluation of the Young Ambassadors for Chemistry
Chair: Lida Schoen
Members: Mei-Hung Chiu, Ponnadurai Ramasami, Erica Steenberg, and Natalia Tarasova
Start: 01 January, 2008

(4) Project No: 2002-021-2-050
Title: A feasibility study of the scope and limitation of machine translations as a means of disseminating useful reading material for chemical education to be used on the internet
Chair: Masato M. Ito and Yoshito Takeuchi
Members: Anthony D. Ashmore, Philippe Boesch, Liberato Cardellini, Choon H. Do, Joseph J. Lagowski, Norma Nudelman, Elisa Pestana, Yuri Vladimirovich Smetannikov, Ting-Kueh Soon, and Qiankun Zhuang
Start:

4.2. Interdivisional Projects (Joint Projects with Other Inter-Division/Standing Committees projects)

(1) Project No. 2008-017-4
(Jointed with)
Title: Green Chemistry – creation and implementation of international cooperation in teaching and investigations
Chair: Prof. Valery V. Lunin
Members: Prof. Natalia P. Tarasova, Prof.Edward Karakhanov, Dr. Ekaterina S.Lokteva, Dr. Fabio Arico, Dr. Mary Kirchhoff, Dr. Elena V. Golubina, Prof. Jie Chang, Prof. Virinder Parmar, Prof. Sayera Rashidova, Prof. HAN, Buxing
Date submitted: 04-Feb-09
Start :
Budget in USD: 10,000

(2) Project No: 2007-038-3-200
(Jointed with Inorganic Chemistry Div)
Title: Development of an isotopic periodic table for the educational community
Chair: Holden, Norman E.
Members: Böhlke, John Karl; Coplen, Tyler B.; Mahaffy, Peter G.; Vocke, Robert D.; Walczyk, Thomas R..; Wieser, Michael; Yoneda, Shigekazu; de Laeter, John R.
Start: 01 April 2008

(3) Project No: 2007-022-2-020
(Jointed with
Title: Recommendations for Codes of Conduct
Chair: Graham S. Pearson

Members: Sultan T. Abu-Orabi, Edwin D. Becker, Alastair W. Hay, Jo Husbands, Peter G. Mahaffy, Robert Mathews, Ting-Kueh Soon, Leiv K. Sydnes, Natalia P. Tarasova, Rietje van Dam-Mieras, and Bernard West
Start: 15 October, 2007

(4) Project No: 2007-032-1-100 (Reported at Mauritius meeting in Aug, 2008)
(**Jointed with** Physical and Biophysical Chemistry Div (I))
Title: Green Book - Abridged Version
Chair: Roberto Marquardt
Members: Brett, Christopher M. A..; Cvitas, Tomislav; Frey, Jeremy G.; Hinde, Robert J.; Holmström, Bertil; Kuroda, Yutaka; Pavese, Franco; Quack, Martin; Smith, Sean; Stohner, Jürgen; Thor, Anders J
Start: 27 November, 2007

(5) Project No: 2006-050-3-100 (Reported at Mauritius meeting in Aug, 2008)
(Jointed with Physical and Biophysical Chemistry Div (I))

Title: Wet surface vibrational spectroscopy experiments
Chair: James McQuillan
Members: Masatoshi Osawa, Derek Peak, Bin Ren, Zhong-Qun Tian, and Thomas Wandlowski
Start: 14 March, 2007

(6) Project No: 2004-045-1-700 (Reported at Mauritius meeting in Aug, 2008)
(Jointed with Chemistry and Human Health Div)
Title: Training of school children on pesticides and health
Chair: Wayne Temple
Members: Rahmat Awang, Nida Besbelli, John H Duffus, Birger Heinzow, Irma Makalinao, Maizurah Oma, Lutz Rexilius, and Fritz Schweinsberg
Start: 01 March, 2005

(7) Project No: 2004-037-1-400 (Reported at Mauritius meeting in Aug, 2008)
(Jointed with Polymer Div (IV)
Title: Design of polymer education material for French speaking countries
Chair: Gerard Froyer
Members: Djafer Benachour, Philippe Dubois, Jean-Pascal Eloundou, Dhanjay Jhurry, Hamid Kaddami, Armand Soldera, and Françoise Winnik
Start: 01 April, 2005

5. Projects under Consideration
5.1. CCE Project

5.2. Interdivisional Projects

(1) Project No : 2009-014-1-Vazquez
Title : Green Chemistry - Sustainable Education and Environmental Development (***SEED***) in Latin America
Chair: Prof. Patricia Vázquez (Argentina), Prof. Vânia Gomes Zuin (Brazil), Prof. Patrick Moyna (Uruguay)
Date Submitted: 21 may, 2009

6. Completed Projects

(1) Project No: 2007-050-2-600
(**Jointed with** Chemistry and Environment Div (VI) and Physical and Biophysical Chemistry Div (I))
Title: Climate and global change: observed impacts on planet earth
Chair: Trevor Letcher
Members: Justin Salminen + authors and co-authors
Start: 01 February, 2008
End: 01 June, 2009

(2) Project No: 2007-018-1-050 (CCE Project)
Title: Towards an improved teaching and learning of chemistry at the tertiary level in the Philippines
Chair: Sevilla, Fortunato
Members: Chiu, Mei-Hung; Llaguno, Elma C.; Patalinghug, Wyona; Resurreccion, Adoracion
Start: 01 July, 2007
End: 31 July, 2008

(3) Project No: 2007-011-1-050 (CCE Project)
Title: International Year of Chemistry - Initial strategy planning
Chair: Ashmore, Anthony D. and Mahaffy, Peter G.
Members: Chiu, Mei-Hung; Hoffman, Morton Z.; Malin, John M.; Moss, Gerard P. Tarasova, Natalia P.; van Dam-Mieras, Maria C. E.

Start: 01 April 2007
End: 01 August 2008

7. Future Projects

(1) Currently, the number of interdivisional projects is growing.
(2) We have to ask the members of CCE to propose more projects.
(3) Developing projects related to IYC 2011 and regional projects may be necessary.

8. Etc.

For more information on the projects of IUPAC:

1) *Advice for Project Reviewers*
2) http://www.iupac.org/Projects
3) http://www.iupac.org/indexes/Projects/bodies/050

9. Appendix 1- Details of the current projects

9.1. CCE Projects

(1) Project No: 2008-043-1-050
- Visualizing and understanding the science of climate change

(2) Project No: 2008-042-2-050
- Development of a framework of priorities for IUPAC Committee on Chemistry Education

(3) Project No: 2007-005-2-050
- Research-based evaluation of the Young Ambassadors for Chemistry

(4) Project No: 2002-021-2-050
- A feasibility study of the scope and limitation of machine translations as a means of disseminating useful reading material for chemical education to be used on the Internet.

9.2. Interdivisional Projects

(5) Project No: 2007-038-3-200
- Development of an isotopic periodic table for the educational community

(6) Project No: 2007-032-1-100 (Jointed with Physical and Biophysical Chemistry Div (I))
- Green Book - Abridged Version

(7) Project No: 2007-022-2-020
- Recommendations for Codes of Conduct

(8) Project No: 2006-050-3-100
- Wet surface vibrational spectroscopy experiments

(9) Project No: 2004-037-1-400
- Design of polymer education material for French speaking countries

9.3. Completed Projects

(10) Project No: 2007-018-1-050 (CCE Project)
- Towards an improved teaching and learning of chemistry at the tertiary level in the Philippines

(11) Project No: 2007-050-2-600 (Jointed with Chemistry and Environment Div (VI) and Physical and Biophysical Chemistry Div (I))

- Climate and global change: observed impacts on planet earth

(12) Project No: 2007-011-1-050
- International Year of Chemistry - Initial strategy planning

(1) Project No: 2008-043-1-050

Title: Visualizing and understanding the science of climate change

Start: 01 February 2009
Project of Committee on Chemistry Education
Chair: Mahaffy, Peter G.
Members: Chiu, Mei-Hung; Engida, Temechegn; Hasler, Julia; Kirchhoff, Mary; Martin, Brian Osborne, Colin; arasova, Natalia P.

Objective:

The chemistry profession and chemistry educators play a crucial role in creating understanding about global climate change and working toward solutions. The objective of this project is to develop a set of interactive, web-based materials for global dissemination to help students visualize and understand the underlying science of climate change. Target audiences are (a) teachers at the secondary and first year tertiary levels, (b) students at those same levels, and (c) chemistry professionals. Visualizations will emphasize the fundamental chemistry of climate processes, but will also present research climate models, and place anthropogenic inputs to our atmosphere in a geo-political context.

Description

The UN resolution proposing that 2011 be declared an International Year of Chemistry (IYC) stresses that “education in and about chemistry is critical in addressing challenges such as global climate change, in providing sustainable sources of clean water, food and energy and in maintaining a wholesome environment for the well being of all people…”

As a contribution to IYC, this project proposes collaboration among the Royal Society of Chemistry, the American Chemical Society, UNESCO, the Alberta Centre for Research in Youth Science Teaching and Learning (CRYSTAL Alberta), and other partners to develop and disseminate a set of interactive, web-based materials to visualize and understand the underlying science of climate change.

Target audiences are (a) teachers at the secondary and first year tertiary levels, (b) students at those same levels, and (c) chemistry professionals. Emphasis will be on the role fundamental chemistry plays in processes affecting earth’s radiation balance.

The RSC has developed text-based materials for 14-16 and 16-18 year old students. The ACS has developed written materials on climate change for tertiary non-science majors. The King’s Centre for Visualization in Science (KCVS) as part of CRYSTAL Alberta has created digital learning

objects (DLOs) addressing the underlying science of climate change. This project will take these existing materials as a starting point, and partners will allocate resources to create several new visualizations and embed all of the visualizations in curricular contexts useful to teachers and students. Where appropriate, material and models from the International Panel on Climate Change and from other IUPAC projects will be incorporated. A web site will be developed to disseminate these materials.

Following the launch of the web site, we envision holding a series of workshops at IUPAC, ACS, RSC, and other conferences for secondary and tertiary teachers. Materials will be peer reviewed, globally disseminated through partner networks and will provide a significant contribution to International Year of Chemistry activities.

In addition to electronic resources, printable versions will be provided on the web, and we will explore partnerships for provision of the entire set of materials on CD or DVD for users without access to high speed internet.

Progress

A preliminary list of topics has been compiled (to be further developed); order of presentation not implied in this list

- Impacts of changing climate (i.e. temperature, precipitation, snow and ice cover, water resources, sea-level, agriculture)
- Radiation balance (i.e. blackbody radiation, radiative cooling, albedo, spectral windows)
- Radiative forcers and feedbacks
- Data on changing climate (temperature, greenhouse gas concentrations, global warming potential, how do we know what we know?)
- Climate models (global climate models, nature of science and uncertainty)
- Spheres of influence (i.e. atmosphere, biosphere, lithosphere, other planetary environments)
- Chemical concepts and curricular linkages (i.e. hydrocarbons as fossil fuels and feedstocks)
- Language and metaphors of global climate change (i.e. weather/climate, “greenhouse” effect, climate change/global warming)
- Open questions (i.e., understanding the oceans, methane clathrate hydrates)
- Solutions and mitigation (i.e. current and alternative energy, carbon capture/storage, mitigation of impacts)

last update 20090320

(2) Project No: 2008-042-2-050

Title: Development of a framework of priorities for IUPAC Committee on Chemistry Education

Start: 01 May, 2009

Project of Committee on Chemistry Education

Chair: Ashmore, Anthony D.

Members: Akesson, Eva; Chiu, Mei-Hung; Kirchhoff, Mary; Lamba, Ram S.

Objective:

The project will develop a framework that will enable IUPAC’s CCE to more effectively prioritise its activities, which include addressing the needs of teachers at all levels; programmes targeting various publics, and continuing professional development for practitioners. The outcome will

enable CCE to communicate its priorities for chemistry education and to develop and pursue a programme to achieve those aims. It will enable CCE to advise IUPAC as a whole, and provide CCE in particular, with a stronger basis for

- informing the priorities CCE presently sets at the beginning of each biennium;
- considering new project proposals and for determining which existing projects should be sustained;
- identifying gaps in activity and soliciting proposals for suitable projects;
- in the next biennium, determining its contribution to the International Year of Chemistry.

The outcome will complement previous work by CCE on priorities in the Public Understanding of Science.

Description

The project arises from a request by the Committee on Chemistry Education (CCE) made at its meeting on 3 Aug 2008. CCE is required inter alia to

"(i) To advise the President and the Executive Committee on matters relating to chemistry education, including the public appreciation of chemistry.

(ii) To maintain a portfolio of educational projects and to coordinate the educational activities of IUPAC."

CCE has published its advice on public understanding (Chem. Int. 2006, July-Aug, p.14).

CCE has asked the task group to develop a complementary framework for the Committee's educational priorities and activities.

The framework will be developed by a project team through consultation with key stakeholders within IUPAC and will be presented to the CCE for adoption. The project is timely as IUPAC builds up to the International Year of Chemistry. CCE wishes to be able to contribute and advise IUPAC on priorities for chemistry education so that IUPAC can give leadership, channel enthusiasm and make decisions about overall priorities and allocation of resources. IUPAC will have to decide on partnership arrangements with other organisations and will need a basis upon which to decide whether there is a compatibility of purpose.

The project will draw together views from Chairs of key IUPAC Committees (COCI, CHEMRAWN, IYC) and produce a framework of education priorities for consultation and approval. The outcome of the project will complement the previously published guide to IUPAC's role in promoting the Public Understanding of Science, also produced under the auspices of the CCE.

(3) Project No: 2007-005-2-050

Title: Research-based evaluation of the Young Ambassadors for Chemistry
Chairman: Lida Schoen
Members: Mei-Hung Chiu, Ponnadurai Ramasami, Erica Steenberg, and Natalia Tarasova

Objective:

- A research-based evaluation of the longer term outcomes about teachers' attitudes towards YAC and international collaboration (Science Across the World) of the first and last successful YAC courses/events in Taiwan (Nov 2005 and Aug 2006) and South Africa (March 2007, with built in evaluation), out of the initial series of YAC courses in five countries (final report: www.iupac.org/projects/2003/2003-055-1-050_Schoen_final-report072107.pdf - 1.35MB).
- A research-based evaluation during new YAC courses/events in Taiwan (Dec 2007) and in Kenya and Mauritius (July/Aug 2008) (these new YAC projects will be funded from other sources) about creating YAC students and YAC teachers and allowing teachers and schools to develop a school-based curriculum that creates uniqueness of the local learning atmosphere and make good use of local facilities for students as well as for the public.
- A research-based evaluation of these new YAC projects will provide insights and vision of collaboration among school administrators, teachers, and students as well as industrial sectors.

Description:

The Young Ambassadors for Chemistry project (YAC - www.iupac.org/projects/2003/2003-055-1-050.html) was carried out from 2004 to 2007 using a '*Train the Trainers*' approach with teachers and students to increase public interest in chemistry in 4 transition areas: Taiwan, Argentina, Russia and South Africa (March 2007) with a 5th successful stop in Gwangju, Korea. Evaluation of the project was based on responses obtained from the public (questionnaires by the YACs) and informal evaluations with participating teachers in the courses as part of YAC projects.

This project will evaluate the results of teacher training and teacher organised YAC events in three target transition regions (Taiwan, Kenya and Mauritius). In Taiwan, dates for YAC Workshops are available in December 2007 and funding for the Workshops and the evaluation are carried by the local organisation. Evaluation in Kenya and Mauritius will only be possible if the local organisations are able to organise and fund YAC workshops.

The entire evaluation project includes 4 evaluations and informal interviews with the participants to investigate the effectiveness and implementation of YAC. There will be 4 areas of evaluation at stages before, during and after the activities:

1. Teacher evaluation about the content knowledge and attitude towards the YAC concept
2. Student evaluation about the content knowledge and attitude towards the YAC idea
3. Public evaluation about the content knowledge and attitude towards the YAC event
4. Local organisers evaluation about successes and problems with the local organisation (funding, venue, etc.)

Attitude testing and cognitive performance evaluation will be administered. For reliability teachers and students will be retested one month later. This primary evaluation will produce data to develop a sustainable model for future YAC programme implementation.

Timeline

1) Evaluation materials written and translated to be used in 3 countries by 2 evaluation experts.
2) Longer term outcomes about teachers' and students' attitudes towards the YAC idea and international collaboration (Science Across the World) from participants of the former YAC courses/events in Taiwan (November 2005 and August 2006) and South Africa (March 2007) to find out whether YAC has planted its seed in Taiwan.
3) Evaluations (data collection) will be carried out in the following countries.
a) Taiwan (December 2007): during a new YAC course/event with new teacher (trainer)s.
b) Africa:
i) Kenya (July/August 2008): evaluation during a new YAC course/event during the pre- or post conference ICCE 20
ii) Mauritius (August 2008): evaluation during a new YAC course/event organised during ICCE 20
4) Analysis of data, guidelines written for future training, organisation of YAC course/events, to support efforts to obtain possible corporate funding.

Progress:

See report prepared by Lida Schoen, Mei-Hung Chíu, and Erica Steenberg; www.iupac.org/projects/2007/2007-005-2-050_report081103.pdf - 370KB).
Last update: 3 November 2008

(4) Project No: 2002-021-2-050

Title: A feasibility study of the scope and limitation of machine translations as means of disseminating useful reading material for chemical education to be used on the Internet.

Chairmen: Masato M. Ito and Yoshito Takeuchi

Members: Anthony D. Ashmore, Philippe Boesch, Liberato Cardellini, Choon H. Do, Joseph J. Lagowski, Norma Nudelman, Elisa Pestana, Yuri Vladimirovich Smetannikov, Ting-Kueh Soon, and Qiankun Zhuang

Objective: To attempt the bi-directional translation of chemical education materials from English to other languages and verse versa using commercially available machine translation software, and to carry out a feasibility study on the establishment of local translation centers where bi-directional translation suitable for dissemination by Internet is regularly carried out.

Description:

In the modern age of globalization, the most desirable situation for all people involved in chemical education is for them to be able to share all important information and materials related to their field. Given that a one-language policy (i.e., everything in English) is an impractical option for a vast number of educators whose native tongue is not English, translation remains the only feasible method available to realize proper English language usage.

In the past, translations performed by human translators were very expensive and time-consuming. In addition, even if translations were to be undertaken, the cost of dissemination of translated materials internationally (e.g., postage) would be prohibitive.

In the age of IT, the situation can be changed by the use of machine translation (MT), an advantage of which is that the translated materials can directly be disseminated via the Internet with nominal cost if the relevant infrastructure is in a reasonable state.

It is often said that the quality of texts obtained through MT is, at this point in time, poor. Henceforth, we can expect that rapid progress will be made with translation software technology. In view of such exciting possibilities, we would like to undertake the following feasibility studies:

1. to test the effectiveness of commercially available MT software in the bi-directional translation of chemical education materials.
2. to study the possibility of establishing bi-directional MT centers in several countries.
3. to disseminate the translated materials and information via the Internet.

Whenever translation is involved, there is a problem of copyright. In this project, the problem of copyright can be circumvented in this way. At the initial (i.e., trial) stage, the material translated FROM English will be restricted to articles in such journals as *Chemical Education International*, *Chemistry International*, and some articles in *Pure and Applied Chemistry*.

As for the materials translated into English, there should be many good articles written in languages other than English for the journals edited and published by national chemical societies. The Chemical Society of Japan, for instance, will agree and welcome the articles in the *Kagaku to Kyoiku* (*Chemistry and Education*), the monthly journal published by CSJ to be translated into English and disseminated to the world via Internet. Chemical societies of other countries will respond in a similar manner. It must be pointed out no attempt will be made translation among non-English languages. In other words, bi-directional translation will be attempted only between English and non-English languages.

Progress:
Early 2004, Prof. Cardellini has volunteered to test a translation software from English to Italians; sample texts can be viewed on wwwcsi.unian.it/educa/ , Cardellini 's website devoted to effective teaching for meaningful learning. For example, see wwwcsi.unian.it/educa/progetti/atkinsit.html, a translation of Atkins' review of the IUPAC Committee on Chemistry Education, or wwwcsi.unian.it/educa/strategie/multimed.html, Agapova's article titled 'Encouraging Independent Chemistry Learning through Multimedia Design Experiences'.
August 2004 - The task group held a mini symposium during the 18th ICCE in Istanbul, and three reports (L. Cardellini, M. Ito, M. Elisa Maia and N. Tarasova) were reviewed, covering tests of machine translations from English into Italian, Japanese, Portugese and Russian. The task group beleives that machine translation is a practical solution to deal with increasing amount of information distributed on the web in English and other languages. Over the next two years, tests should be extended to other European and non-European languages. While the distribution of chemical information should only be checked by chemists and chemical educators themselves, the task group will also consider the possibility of having the products distribution managed by chemistry clearing houses. Examples were presented by Dr. Tarasova > see 'Clearing House' project.
Dec 2006 - see updates reported in *CEI* 2006 <www.iupac.org/publications/cei/vol7>

(5) Project No: 2007-038-3-200

Title: **Development of an isotopic periodic table for the educational community**

Start: 01 April 2008

Project of Inorganic Chemistry Division **and** Committee on Chemistry Education

Chair:
Holden, Norman E.

Members:
Böhlke, John Karl
Coplen, Tyler B.
Mahaffy, Peter G.
Vocke, Robert D.
Walczyk, Thomas R.
Wieser, Michael
Yoneda, Shigekazu
de Laeter, John R.

Objective

The objective of this project is to clarify the role of isotopes in chemistry and other sciences.

Description

This project along with a follow-on project will develop, with the help of the Committee on Chemistry Education (CCE), learner oriented materials on an interactive periodic table that emphasizes the existence of isotopes and the role of isotopic compositions of elements on determination of atomic weights, and applications in sciences. In order to reach, and capture the attention and the interest of students and teachers at the primary, secondary, and tertiary educational levels, there is a need to make creative use of wide range of media.

Working CCE, a periodic table will be developed which will provide a wide range of isotopic based information (e.g., number of stable and unstable isotopes, representative isotopic composition, and atomic weight values). Information, case studies, and other links about the application of isotopes to chemistry and other sciences will also be provided. CCE will provide input on topics of relevance to interest to students and advice on the types of interaction, while other task group members will provide the scientific data. Advice will be sought on the best educational strategies to capture and hold students' attention. Both online and paper based versions of the materials will be developed. In this first project, the isotope based information will be collected and stored in data files and CCE will provide input on topics of relevance to interest students and advice on the types of interaction, while other task group members will provide the scientific data. The web-site version of the Periodic Table will be addressed in the subsequent project proposal.

Progress

project announcement published in *Chem. Int*. July 2008

(6) Project No: 2007-032-1-100

Title: **Green Book - Abridged Version**

Chairman: Roberto Marquardt

Members: Chris Brett, Tom Cvitas, Jeremy Frey, Robert Hinde, Bertil Holmstroem, Yutaka Kuroda, Franco Pavese, Martin Quack, Sean Smith, Juergen Stohner, and Anders Thor

Objective: To provide an abridged student version of the 3rd edition of the IUPAC Green Book (Quantities, Units and Symbols in Physical Chemistry) suitable for University teaching, and continuing education in an industrial context. The book will consist of 40-50 pages, which will be made available both as printed material and via the web together with appropriate tutorial examples and exercises.

Description:

The project will create a new version of the 3rd Edition of the Green Book suitable for students and continuing education. The project aims to offer learning support of the typical contents of physical chemistry at the University level by restricting the range of topics covered in the Green Book (3rd Ed), to the main topics that are important for students, i.e. General Chemistry, Thermodynamics, Kinetics, Spectroscopy and Basic Physics. The 'light' version will focus on examples of the best practice in the use of terminology, quantities, units and their symbols. To determine the best content suitable for teaching purposes the project will consult with the Committee on Chemistry Education (CCE) and teaching organizations.

Progress:

Last update: 3 December 2007

<project announcement published in *Chem. Int*. 30(2) 2008>

(7) Project No: 2007-022-2-020

Title: Recommendations for Codes of Conduct

Chairman: Graham S. Pearson

Members: Sultan T. Abu-Orabi, Edwin D. Becker, Alastair W. Hay, Jo Husbands, Peter G. Mahaffy, Robert Mathews, Ting-Kueh Soon, Leiv K. Sydnes, Natalia P. Tarasova, Rietje van Dam-Mieras, and Bernard West

Objective:

To develop recommendations for Codes of Conduct for chemists that might be promulgated by IUPAC and its NAOs.

Description:

IUPAC serves to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of humankind. As a scientific, international, non-governmental and objective body, IUPAC addresses many global issues involving the chemical sciences. Adoption of recommendations for guiding principles for codes of conduct by IUPAC would serve to promote the effective and responsible use of chemical sciences.

As there is growing concern that chemicals should be used for good and not for ill, there are responsibilities for those engaged in science and technology using chemicals to ensure that their activities are aimed only at bringing benefit to humankind and to the environment. Their work needs to be, and perceived to be, in compliance with the international treaties and national laws and regulations prohibiting chemical or biological weapons, illicit drugs, and relating to banned and severely restricted chemicals and the environment such as the Rotterdam Convention on the Prior Informed Consent Procedure, the Stockholm Convention on Persistent Organic Pollutants, the Montreal Protocol and the Basel Convention on Hazardous Wastes.

It is evident that increasing attention is being given around the world to ethical principles and codes and that the new generation of chemists are keen to see consideration of ethical and other considerations, such as the environment, taken into account. Guiding principles for a code of conduct would strengthen international chemistry, and help to achieve high standards of excellence and relevance in academic, governmental and industrial activities and promote the service of chemistry to society and to global issues.

Guiding principles for a code recommended by IUPAC would recognise the extraordinary benefits to the quality of life, public health and agriculture throughout the world made available by the knowledge, methods and techniques in science and technology using chemicals. It would promote all aspects of chemistry, not just among members of the profession, but increasingly to the worldwide community.

While chemistry can greatly improve the quality of life, we recognize both the potential and power of chemistry, and acknowledge that it should be approached with an appropriate mixture of enthusiasm and sensitivity to social issues. While chemistry provides many valuable benefits for humankind, it can also raise important ethical issues. These issues can evolve as more development and uses of chemistry occur and guiding principles for a code of conduct would provide a framework within which to consider such issues.

While some principles relating to science and technology using chemicals are codified in international treaties, national legislation, statutes and regulations, guiding principles for a code of conduct recommended by IUPAC is intended to provide guidance to all those using chemicals. These principles would complement other codes at other levels.

In developing the guiding principles, a process of widespread consultation across different cultural perspectives around the world will ensure that the guiding principles for codes recommended by IUPAC are informed by the experience of other professional bodies with codes, including the extensive work in the chemical industry to develop codes such as Responsible Care and the work by UNESCO and ICSU on education and codes.

In order to have an impact on practice, codes need to be dynamic rather than static, and the codes need to be incorporated into a continuing process that is considered prior to each new piece of work. Consideration will be given to how to help ensure that IUPAC can, in the future, engage in processes that help the guiding principles recommended by IUPAC to be embodied in the practice of chemistry.

Progress:
Nov 2008 - Graham Pearson and Alastair Hay participated in August 2008 in Geneva, Switzerland at the Meeting of Experts of the Biological and Toxin Weapons Convention. IUPAC participation in this BTWC meeting was useful in that it enabled the States Parties to be made aware of what IUPAC had done and is doing that is relevant to the ongoing efforts of the States Parties to the BTWC. Their statement delivered on 21 Aug 2008 is available here [pdf file - 156KB]. The meeting was also useful as it enabled this project chair to gain information on developments in regard to codes of conduct notably by the UNESCO Division of Ethics of Science and Technology as well to meet with other members of this project task group.
A report of that meeting will appear in *CI*.

Last update: 8 November 2008

<project announcement published in *Chem. Int*. Jan-Feb 2008 >

(8) Project No: 2006-050-3-100

Title: Wet surface vibrational spectroscopy experiments
Chairman: James McQuillan
Members: Masatoshi Osawa, Derek Peak, Bin Ren, Zhong-Qun Tian, and Thomas Wandlowski
Objective:
To promote the application of wet surface vibrational spectroscopies (ATRIRS, SEIRAS, SERS) to problems in interfacial chemistry by selecting, testing, and disseminating to universities a collection of experiments suitable for undergraduate teaching laboratories and able to be performed with inexpensive equipment.

Description:
Undergraduate experiments in interfacial chemistry are presently dominated by measurements of macroscopic quantities such as surface tension and amount adsorbed when increasingly spectroscopic and microscopic data are presented in the corresponding lectures. IUPAC can take a lead in encouraging a more modern molecular approach to interfacial physical chemistry through international collaboration of leading expertise to compile and test a series of appealing experiments which can be readily carried out in undergraduate laboratories with relatively inexpensive equipment.

This project brings together leading physical chemists in the fields of attenuated total reflection infrared spectroscopy (ATRIRS), surface enhanced infrared spectroscopy (SEIRAS), and surface enhanced Raman spectroscopy (SERS), to select practicable experiments which can be carried out in teaching situations throughout the world. Both SERS and SEIRAS employ finely divided metal surfaces while the ATRIRS particle film approach can be applied to any solid. All of the chosen surface spectroscopies are applicable to solid/aqueous interfaces that are of considerable interest in studies of natural and technological systems. Examples include the study of adsorbed electrode intermediates and the investigation of adsorbed collectors used as flotation agents for mineral extraction.

The ATRIRS experiments will include the basis of ATR-IR spectroscopy, the measurement of solution spectra, the preparation of colloidal particles of substrate materials, the measurement of spectra of adsorbed species including eg oxalic acid on TiO_2, sulfate on hematite, adsorption kinetics and adsorption isotherm determinations.

The SEIRAS experiments will include a brief introduction to the mechanism of the IR absorption enhancement and the procedures for preparing SEIRA-active thin metal films on a Si ATR prism. By using a thin metal film as the working electrode, adsorption and reaction of molecules on the electrode surface will be examined in aqueous solution under electrochemical control. The electrocatalytic oxidation of methanol on Pt will be used as a model system. By comparing the SEIRA spectra of adsorbed CO and adsorbed formate with the cyclic voltammogram acquired simultaneously, students can know that CO is a poison and formate is a reaction intermediate in methanol electrooxidation.

The SERS experiments will include: introduction of basis of Raman spectroscopy, instrumentation; measurement of liquid (CCl4 and H_2O), and solid sample (Silicon as sensitivity and frequency calibration standard); Electrochemical roughening of massive silver electrodes; Preparation of Au sol, which will be used as it is or dispersed as SERS substrate; SERS measurement on Silver surface, Au sol and the sol dispersed surface; Preparation of SERS active Pt surface. The probe species will be pyridine and SCN^-.

Most undergraduates have access to infrared spectrometers in teaching laboratories so that the ATRIRS and SEIRAS experiments would be expected to find more widespread use. However, Raman instruments are decreasing in cost and more frequently found in undergraduate laboratories, which justifies the inclusion of SERS experiments.
The experiments will be tested and refined in their laboratories of origin, followed by testing in at least two university undergraduate laboratories elsewhere under normal laboratory conditions.
Progress:

Last update: 15 March 2007
<project announcement published in *Chem. Int*. Jul/Aug 2007, p. 19>

(9) Project No: 2004-037-1-400

Title: Design of polymer education material for French speaking countries
Chairman: Gerard Froyer
Members: Djafer Benachour, Philippe Dubois, Jean-Pascal Eloundou, Dhanjay Jhurry, Hamid Kaddami, Armand Soldera, and Françoise Winnik

Objective:
The aim of this project is to provide the French-speaking countries with a standard for polymer education based on various tools such as books, multi-media or databases.

Description:
The need for a standard in polymer education is recognized and expressed by French speaking academics of both emerging and developed countries.
The proposed new materials will be elaborated by partners working in separate task groups, each one focusing on specific medium. The choice of topics to be developed will be made after discussion taking into account the minimum 50-hour program already recommended in France by the French Polymer Group (GFP).

Therefore the project should lead to materials illustrating the basic standard in polymer education for French speaking academics has been active in the production of books to be used as standard for recently nominated teachers. However these books are only available to GFP members.
The task group of this project includes professors from several countries part of Europa, Africa and America. Their work would focus on the elaboration of new books and other media in an effort to give a attractive approach of polymer education in French speaking countries around the world.
Anticipated Impact - It is expected that the materials that will be developed will serve as a standard for the teaching of Polymer Science at undergraduate level in the French-speaking countries. The access to such materials free of charge or at a very low cost will not only be helpful to academics in these countries but will certainly attract more students and foster the discipline
Progress:
Project update published in *Chem. Int*. Sep-Oct 2006
Last update: 21 September 2006
<project announcement published in *Chem. Int.* Jul- Aug 2005 >

Appendix 9. 3. Completed Projects

(10) Project No: 2007-018-1-050 (CCE Project)

Title: Towards an improved teaching and learning of chemistry at the tertiary level in the Philippines

Start: 01 July 2007
End: 31 July 2008
Chair: Sevilla, Fortunato
Members:
Chiu, Mei-Hung
Llaguno, Elma C.
Patalinghug, Wyona
Resurreccion, Adoracion

Objective
- To update the methods of teaching and learning chemistry at the tertiary level in the Philippines.
- To promote a learner-centered curriculum in the B.S. program for Chemistry.
- To facilitate the adoption of innovative schemes in laboratory instruction towards reducing the costs and hazards associated with the laboratory courses.

Description
The curriculum for the B.S. program for Chemistry has been recently assessed, and revisions have been undertaken for the updating of the various courses in the curriculum international benchmarks were employed in the evaluation of the content of the courses to ensure their up-datedness. However, concern has been expressed about the delivery of these courses, particularly the approaches to classroom and laboratory instruction and the use of information technology. Indeed, the updating of the contents of the B.S. Chemistry curriculum has to be matched with an updating of the teaching methods employed, and the

foregrounding of learner-centered approaches in chemistry education.

The project will involve the following activities:

1. Preliminary discussions of the Technical Committee for Chemistry with resource persons from CCE. These discussion will consider the following areas:
   - a. the existing curriculum for the training of chemists;
   - b. schemes for improving the quality of teaching and learning chemistry;
   - c. research training of chemistry students;
   - d. the hands-on training and practical work experience of chemistry students;
   - e. partnership programs with industry and government
2. Organization of a conference on "Upgrading Chemical Education in the Philippines". This conference will highlight important topics covering chemical education in the secondary and tertiary levels. It will feature lectures and workshops to be presented by the CCE resource persons and other identified speakers.
3. Formulation of follow-up activities, which will focus on specific areas of chemical education.

   [more about the Flying chemists program]

Progress

The program of the 2-day conference "Improving Chemical Education in the Philippines", to be held **17-18 April 2008**
at the University of Santo Tomas, in Manila, Philippines, is the following:

Day 1
7:30 - 8:30 Registration
8:30 - 9:00 Opening ceremonies
9:00 - 9:40 Talk 1: Educating the chemist, **Prof. Peter Atkins**, Oxford University, U.K.
9:40 - 10:00 Open forum
10:00 - 10:30 Break
10:30 - 11:10 Talk 2: New technologies and new approaches in chemistry education, **Prof. Peter Mahaffy**, King's University, Canada P.M.
11:10 - 11:30 Open forum
11:30 - 12:00 Picture taking
12:00 - 13:30 Lunch
13:30 - 14:10 Talk 3: Microscale chemistry and Green Chemistry, **Prof. Jorge Ibanez**, Universidad Ibero-americana, Mexico
14:10 - 14:30 Open forum
14:30 - 15:10 Talk 4: Low-cost Instrumentation, **Prof. Fortunato Sevilla III**, University of Santo Tomas, Philippines
15:10 - 15:30 Open forum
15:30 - 16:00 Break
16:00 - 17:30 Workshop / demonstration - 1

· Microscale chemistry
· Low-cost instrumentation
· Visualization in chemistry
Day 2
8:00 - 8:40 Talk 5: Pedagogical evaluation of the chemistry integrated laboratory Program, **Prof. Mei-Hung Chiu**, National Taiwan University, Taiwan
8:40 - 9:00 Open forum
9:00 - 9:40 Talk 6: Industry as stake holder in chemistry education, *tba*, Philippines
9:40 - 10:00 Open forum
10:00 - 10:30 Break
10:30 - 12:00 Group discussion session
12:00 - 13:30 Lunch
13:30 - 15:00 Workshop / demonstration - 2
· Microscale chemistry
· Low-cost instrumentation
· Visualization in chemistry
15:00 - 15:30 Break
15:30 - 16:30 Plenary session: Report of discussion groups
16:30 - 17:30 Plenary session: Plan of action
17:30 - 18:00 Closing ceremonies
For inquiries, contact
Kapisanang Kimikang Pilipinas
Telefax No. 920-5427
Email: ivillase@yahoo.com
project completed - a conference report has been published in *Chem. Int.* July 2008, p. 29.

(11) Project No: 2007-050-2-600 (Jointed with Chemistry and Environment Div (VI) and Physical and Biophysical Chemistry Div (I))

Title: Climate and global change: observed impacts on planet earth
Chairman: Trevor Letcher
Member: Justin Salminen + authors and co-authors
Objective:
The objective of the book is to have all the scientific arguments and evidence relating to 'climate and global change' in one book, with each chapter written by an expert scientist working in the relevant field. Unlike the IPCC report it will cover the huge area involving "Indicators of Climate and Global Change". The book will be an unemotional presentation of the facts and should become a standard reference in the field for years to come. It is an honest answer to the large amount of misinformation that is being generated about the subject.
Description:
See draft contents in the Progress section below.
Perhaps the most important aspect of this book, and where it differs from other books of similar title, is that each chapter will be written by an expert scientist working in the field, and not by non-scientists, politicians or journalists with little or no technical background. Each chapter will contain a summary written in a non-scientific way, for the benefit of the general public.

Progress:
The details of the proposed 30 chapters are given below:
(as of 1 Feb 2008)
Climate and Global Change: Observed Impacts on Planet Earth Foreword - Sir David King, Director of the new Environmetal Institute of Oxford University
Preface - T.M. Letcher and M. Attrill
POSSIBLE CAUSES OF CLIMATE AND GLOBAL CHANGE
1. Chemistry of the Atmospheric Gases and Global Change possibly by Dr Drew Shindler, NASA, USA or TM Letcher
2. Role of Carbon Dioxide in Global Warmingby Dr Guy Brasseur, National Centre for Atmospheric Research, Boulder, USA
3. Role of Methane etc. in Global Warmingby Dr Jeff Kiehl, NCAR, Boulder, USA
4. Role of Water Vapour in Global Warming by Dr Andrew Dressler, Texas A and M University, USA
5. Evidence for Worldwide long term trends in Solar Radiation and possible causes for these Trends by Dr Shabtai Cohen, Department of Environmental Physics and Irrigation, Institute of Soils and Environmental Sciences, The Volcani Centre, Bet Dagan, Israel.
6. The Role of Space Weather Effects in Climate and Global Change, by Professor Lev I Dorman, Head of Israeli Cosmic Ray and Space Weather Centre, Tel Aviv University and Israel Space Agency and Technion.
7. The Role of Volcanic Activity in Climate and Global Change,by Professor Georgiy Stenchikov, Rutgers University, New Jersey, USA.
8. The Role of Variations of the Earth's Orbital Characteristics in Climate Change, by Professor Lucas Lourens, University of Utrecht, The Netherlands.
9. The Role of Cosmic Radiation in Climate Change and prediction, by Professor Lev I Dorman, Head of Israeli Cosmic Ray and Space Weather Centre, Tel Aviv University and Israel Space Agency and Technion.
GEOLOGICAL HISTORY OF THE EARTH'S CLIMATE
10. A Geological History of the Earth's Climate, by Dr Jan Zalasiewicz and Dr Mark Williams, University of Leicester, UK
INDICATORS OF CLIMATE AND GLOBAL CHANGE
11. Weather patterns as an indicator of Global Change by Dr Tim Osborn, University of East Anglia, UK
12. Bird Behaviour as an Indicator of Climate Change by Dr Wolfgang Fiedler, Max Planck Institute for Ornithology, Radolfzell, Germany.
13. Mammal Ecology as an Indication of Climate Change by Murray Humphries, Natural resource Sciences, McGill University, Montreal, Canada
14. Insect Ecology as an Indicator of Climate Change by Professor Jessica Hellmann, Notre Dame University, USA and Professor Rick Lindroth, University of Wisconsin-Madison, USA.
15. Sea Life (pelagic and planktonic ecosystems) as an Indication of Global Change by Dr Martin Edwards and Professor Chris Reid, SAHFOS, Plymouth, UK
16. Sea Life (benthic and seabed ecosystems) as an Indication of Global Change by Professor Martin Attrill, Marine Ecology, University of Plymouth, UK
17. Changes in Marine Biodiversity as an Indicator of Climate and Global Change by Dr Boris Worm, Dalhousie University, Nova Scotia, Canada
18. Inter-tidal Indicators of Climate Change, by Dr Nova Mieszkowska, Marine Biological Association Laboratory, Plymouth, UK
19. Plant Behaviour as an Indicator of Climate Change by Professor James Morison, University of Essex, Colchester, UK

20. Rising Sea Levels by as an Indicator of Global Change by Dr Roland Gehrels, Dept of Geography, University of Plymouth, UK
21. Sea Temperature as an Indicator of Global Change, by Professor Martin Attrill, Marine Ecology, University of Plymouth, UK
22. Ocean Current changes as an indicator of Global Change,by Professor Martin Visbeck, Leibnitz Institute of Marine Sciences, Kiel, Germany and Dr Torsten Kanzow, National Oceanographic Centre, Southampton, UK
23. Ocean Acidification as an Indicator of Global Change, by Professor James Orr, UMR CEA-CNRS,CEA, Gif-sur-Yvette, France
24. Glacial and Polar Cap Melting as an indicator of Global Change, by Dr David Vaughan, British Antarctic Survey, Cambridge University, UK
25. Lichen as an indicator of Climate Change, by Dr A Aptroot, ABL Herbarium, Soest, The Netherlands
26. Changes in The Earth's Mean Energy Budget as an indicator of Climate and Global Change by possibly by someone from the Tyndall Centre, UK
27. Coastline Degradation as an indication of Global Change, by Professor Robert Nicholls, Tyndall Centre for Climate Change Research, University of Southampton, UK and Professor Colin Woodroffe, University of Wollongong, and Virginia Burkett (USGS)
28. Changes in Plant Pathogens as an indication of Climate and Global Changeby Professor Karen Garrett, Kansas State University, USA
MODELLING OF CLIMATE CHANGE
29. Predicting and Modeling Climate and Global Change By Dr Bruce Wielicki, NASA, USA
30. CONCLUSIONS
Last update: 27 February 2008
<project announcement to be published in *Chem. Int.* >

(12) Project No: 2007-011-1-050
Title: International Year of Chemistry - Initial strategy planning

Start: 01 April 2007
End: 01 August 2008
Project of Committee on Chemistry Education
Chair:
Mahaffy, Peter G.
Ashmore, Anthony D.

Members:
Chiu, Mei-Hung
Hoffman, Morton Z.
Malin, John M.
Moss, Gerard P.
Tarasova, Natalia P.
van Dam-Mieras, Maria C. E.

Objective
To develop for IUPAC a plan to secure the designation by UNESCO of an International Year of Chemistry.
Description
A number of scientific disciplines have achieved significant benefits through securing

designation by UNESCO of an International Year of X. The International Year of Physics was deemed to be a particular success by that community.

IUPAC's Bureau has indicated that it would like IUPAC to secure designation by UNESCO of an International Year of Chemistry and has asked the Committee on Chemistry Education to take the lead. Information has been gathered about other International Years and exploratory talks have been held with UNESCO officials. Securing designation requires support from UNESCO centrally, the permanent representatives to UNESCO and national commissions.

Progress

A meeting of the task group with officials and permanent representatives of UNESCO is being planned for May 2007.

August 07: At its recent Assembly on August 11-12 August 2007, IUPAC Council endorsed the plan to obtain United Nations approval of 2011 as an International Year of Chemistry. The Union invited all Adhering Organizations, Associated Organizations, and other Chemical Societies to assist with a designation that would create a strategic opportunity to communicate the central importance of chemistry in every facet of modern life. [more]
May 08:
The Executive Board of UNESCO, in its meeting of April 17, 2008, has endorsed the proposal for proclamation by the United Nations of 2011 as an International Year of Chemistry (IYC).
The wording of the proposal is as follows:
The Executive Board,
1. Recognizing that humankind's understanding of the material nature of our world is grounded in our knowledge of chemistry,
2. Stressing that education in and about chemistry is critical in addressing challenges such as global climate change, in providing sustainable sources of clean water, food and energy, and in maintaining a wholesome environment for the well-being of all people,
3. Considering that the science and application of chemistry produces medicines, fuels, metals, and virtually all other manufactured products,
4. Taking note of the ongoing United Nations initiatives in industrial best practices,
5. Aware that the year 2011 provides the opportunity to celebrate the contributions of women to science on the one hundredth anniversary of the awarding of the Nobel Prize in Chemistry to Maria Sklodowska-Curie,
6. Being further aware that the year 2011 provides the opportunity to highlight the need for international scientific collaboration on the one hundredth anniversary of the founding of the International Association of Chemical Societies,
7. Having examined document 179 EX/47 and Add. Rev., [containing supporting letters and statements from numerous National Adhering Organizations and delegations]
8. Welcomes the unanimous resolution of the International Union of Pure and Applied Chemistry (IUPAC), at its 2007 Council meeting, to declare 2011 as the International Year

of Chemistry and to play a lead role in coordinating and promoting chemistry activities at the national and regional levels around the world;
9. Invites the Director-General to support all efforts leading the United Nations General Assembly to declare 2011 the International Year of Chemistry;
10. Recommends that the General Conference adopt, at its 35th session, a resolution on this subject.
The proposal was placed before the UNESCO Executive Board by the Ethiopian representative and supported officially by approximately twenty five other countries.
> read more in SG column, CI July-Aug 2008, p. 2
project completed
Follow-up is being continued under project 2008-021-1-020

Appendix 2 – List of CCE Projects*

(from website of IUPAC, http://www.iupac.org/indexes/Projects/bodies/050

Project No. 2008-042-2-050: Development of a framework of priorities for IUPAC Committee on Chemistry Education
Project No. 2008-043-1-050: Visualizing and understanding the science of climate change
Project No. 2007-038-3-200: Development of an isotopic periodic table for the educational community
Project No. 2007-050-2-600: Climate and global change: observed impacts on planet earth
Project No. 2007-005-2-050: Research-based evaluation of the Young Ambassadors for Chemistry* project
Project No. 2007-032-1-100: Green Book - Abridged Version
Project No. 2007-018-1-050: Towards an improved teaching and learning of chemistry at the tertiary level in the Philippines
Project No. 2007-011-1-050: International Year of Chemistry - Initial strategy planning
Project No. 2006-050-3-100: Wet surface vibrational spectroscopy experiments
Project No. 2006-043-3-050: The Social Responsibility of Chemists: Responsible Stewardship
Project No. 2005-002-2-050: Micro-scale chemistry for student laboratories in India
Project No. 2005-030-1-050: New directions in teaching, learning and evaluation of chemical sciences at tertiary level in Sri Lanka
Project No. 2005-029-1-050: Educational material for raising awareness of the Chemical Weapons Convention and the multiple uses of chemicals
Project No. 2005-028-1-050: Multiple use of chemicals and professional code of conduct
Project No. 2005-003-2-050: e-Quiz for promoting chemical education
Project No. 2004-047-1-050: Public understanding of science: identifying IUPAC's niche
Project No. 2004-037-1-400: Design of polymer education material for French speaking countries
Project No. 2005-004-1-050: Flying chemists program - 2005 visit to India
Project No. 2004-045-1-700: Training of school children on pesticides and health - "Toxicology in the classroom"
Project No. 2003-055-1-050: Young Ambassadors for Chemistry (YAC)
Project No. 2001-053-2-700: Fundamental toxicology for chemists
Project No. 2002-021-2-050: A feasibility study of the scope and limitation of machine translations as a means of disseminating useful reading material for chemical education to be used on the Internet.
Project No. 2001-016-1-050: IUPAC chemical nomenclature for chemistry teachers at secondary

schools
Project No. 2001-045-1-050: DIDAC worldwide
Project No. 2002-010-1-050: Toward a core organic chemistry curriculum for Latin American universities
Project No. 2001-046-1-050: Introduction of small scale chemistry experiments - Teacher training
Project No. 2001-054-1-025: Inter-Union meeting on education
Project No. 2001-003-5-050: Organisation of Clearing House for the translation, publication, and dissemination of the IUPAC-sources materials and ideas in chemical education in Russia and CIS.
Project No. 2000-020-2-200: Collecting, testing and dissemination of experiments in solid state and materials chemistry
Project No. 1999-035-1-025: Chemical Education and Sustainable Development, International Conference on
Project No. 025/50/99: Cost-effective Chemistry in the Primary School
Project No. 025/49/98: International Curriculum Development
Project No. 025/48/96: Design and Field-Testing of a Teaching Package for Environmental Chemistry
Project No. 025/47/96: Education in Chemistry and Human Health
Project No. 025/46/96: Education in Chemistry and the Environment
Project No. 025/45/93: Education in Chemistry and Industry
Project No. 025/44/91: Source Books for Teaching of Chemistry
Project No. 025/34/89: International Network for Locally Produced Low Cost Equipment
Project No. 025/33/89: Distance Education in Chemistry
Project No. 025/27/85: International Newsletter on Chemical Education

Acknowledgement:

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