IUPAC – CCE
Meeting 2-3 august 2009

Chemistry teaching in Belgium
Main problems and realizations 2007 - 2009

1. In 2008 an official quality audit has taken place , in Flanders, of the polytechnical institutions with a training for **Professional Bachelors in Chemistry** (3 year higher education for chemistry laboratory technicians and analysts). The official audit commission was impressed by the very high standards of this programmes and the professional knowledge and devotion of the teaching staffs.

2. Generally higher education programmes for chemistry at universities and at the polytechnics , still suffer from a low input of freshmen students. Especially at the faculties of sciences in the universities the upgrading from the 4 years licentiate – programmes to a **five years bachelor (3years) + master (2 years) programmes is actually not yet very successful, concerning the number of students** that starts a training for a bachelor and/or master degree in chemistry. On the other hand the number of Phd – students is relatively high , but mainly due to the in stream of foreign students.

3. At some universities a special **one year master programme** has been introduced for future chemistry teachers . Although this programme aims to improve the **training of A-level chemistry teachers** (for secondary school students at the ages 16- 17) and has a really good curriculum , it seems to become a complete disaster because only a very few number of students are interested in such a teaching oriented master programme. Even the master programmes for teaching physics , biology , and even for mathematics and for general science also struggle with the same disappointing symptoms.

4. In the training institutions (Bachelors degrees 3 years) for teachers in the lower levels of secondary schools (pupils'ages 12-15), chemistry as a separate subject has almost disappeared. However the ministry of education will introduce in september 2010 a **renewed package of aims and objectives for the sciences in the first degree of secondary schools** (pupils'ages 12-13) . Hereby some elementary introduction to chemistry will now be included , and this could bring about in future a re-introduction and updating of chemistry in these teacher training institutions.

5. The situations mentioned sub 3 and 4 , results in a regrettable educational system , whereby most of the chemistry in secondary schools has been teached by **teachers without sufficient chemical knowledge and didactical experience.** This is deplorable because in this way the use of the merely rather good infrastructure of school laboratories for chemistry is poor and the experimental and attractive aspects of chemistry are insufficiently incorporated in the teaching methods.

6. The national selections for the **Chemistry Olympiads are still very successful**. About 2000 students take part in these competitions. Especially in Flanders there is an increasing number of participants as the Flemish competitions seems to be a good preparation towards the entrance examinations for the faculties of medicine.

7. A lot of scientific and / or chemical organisations still organize or support several activities for science / chemistry teachers and to stimulate the curiosity of young children (age 7 – 11) and older pupils (age 12- 17) for the sciences / chemistry . Although most of these activities may enjoy a great interest of an enthusiast public , they do not seem to influence mainly the in stream numbers for pure sciences / chemistry in higher education. **Probably there remains still a too big gap between the sciences at schools ('dull and difficult ') and the sciences outside schools ('attractive and understandable ') .**

em.prof. Ludo Brandt
IUPAC-CCE NR-Belgium

Report from the United States

Morton Z. Hoffman (Boston University), National Representative to CCE

New ACS Undergraduate Chemistry Guidelines

Because the U.S. Constitution places education solely in the hands of the individual states, there can be no nation-wide federal governmental control of content or pedagogy at any educational level. However, professional organizations have the right to assess the education of students in that profession in order to make sure that standards are upheld. Thus, through its Committee on Professional Training (CPT), the American Chemical Society (ACS) can evaluate the quality of chemistry programs at colleges and universities within the U.S., approve those programs, and certify that bachelor graduates have satisfied the ACS guidelines.

The guidelines have changed over the years as the undergraduate chemistry curriculum has evolved. In general, they have always specified the minimum number of faculty members, the percentage of full-time and adjunct appointments, the number and type of equipment and instrumentation, and the range of library holdings and, most recently, on-line subscriptions. The "standard" curricular model for the chemistry major (general chemistry; core courses in analytical, inorganic, organic, biochemistry, and calculus- and physics-based physical chemistry; advanced courses that may include undergraduate research) was specified as well as a minimum number of credits and laboratory hours. The recent guidelines permitted other degree options, for example, in biochemistry, chemical physics, environmental chemistry, materials, polymers, and chemical education in addition to the standard program.

In 2008, new guidelines for approved chemistry programs and certified bachelor graduates were established by ACS; implementation will take place over the next five years within the framework of the renewal and new application process. The new guidelines continue to specify credit and laboratory time minima as before, but also make recommendations about pedagogy, the general chemistry course, foundation courses (the equivalent of one-semester courses in each of the five major areas of chemistry), in-depth courses (the equivalent of four one-semester courses that build on the foundation), laboratory experience that may include undergraduate research, and cognate courses. Degree tracks, which are specialized, department-designed curricula to meet the foundation, in-depth, and laboratory requirements, may be in chemistry, a specific chemistry subdiscipline, or chemistry-related multidisciplinary area. The guidelines also emphasize the development of skills by the students that will allow them to become effective and productive scientists, and successful professionals: problem solving, chemical literature, laboratory safety, communication, and teamwork. Ethics must be exemplified at every turn, and student mentoring and advising are recognized as central to student achievement. Finally, approved programs will have to have established processes whereby these student skills are assessed. For more information about the new ACS guidelines, see <www.acs.org/cpt>.

ACS and IYC

The ACS website has a page for IYC; see <www.acs.org/iyc2011>. An invitation is made to ACS members and friends of chemistry to help plan how to celebrate the transforming power of chemistry. Chemistry enthusiasts from around the world are being asked to contribute to the planning, implementation, and evaluation of IYC-2011 programming. Ideas are requested to increase the public appreciation of chemistry in meeting world needs, increase interest of young people in chemistry, generate enthusiasm for the creative future of chemistry, and

celebrate the 100th anniversary of the Mme. Curie Nobel Prize and the 100th anniversary of the founding of the International Association of Chemical Societies.

In particular, ACS is working to urge the U.S. Postal Service to adopt chemistry as a theme for a commemorative stamp in 2011 in honor of IYC, in view of the contributions of chemistry to the well-being of humankind in the U.S. and worldwide. Inasmuch as the Postal Service gets approximately 50,000 subject requests per year and awards only 25 commemorative stamps per year, ACS members and friends are being asked to download a petition in support of the issuing of a stamp, distribute the petition for signature among colleagues, students, and friends, and send the completed petitions to the ACS Office of International Activities no later than November 1, 2009.

SOCIETÀ CHIMICA ITALIANA

Annual Report from Italy on Chemical Education 2008-2009

Abstract

This year the Chemical Education Division of Italian Chemical Society has worked to realize three projects for the teachers of all kinds of school in addiction to the usual study and research.

Introduction

The Chemical Education Division of Italian Chemical Society keeps on studying and researching for chemistry teaching's improvement. These studies are related to the high school and the university. This year, in particular, we decided to follow up educational initiatives for all kinds of teachers (academic teacher inclunding). So we are working about three projects that we describe on the trot.

Presentation of the projects

1. educational project for the compulsory schooling (Piano ISS). With this year we have completed the first fase of the study. About nine hundred teachers have applied the philosophy of this plan in their classrooms, that consists in an intelligent use of experimental work to support their educational activity.
We hope to have the opportunity to value the results of this activity and to realize a meeting in order to obtain materials useful .

2. continuation of an educational project for the high school's teachers. This project conforms with Action's Line 2 "Educational and updating courses for science's teachers" of Scientific University Degree's Project (PLS). Our Division attend it with several academic members. With this project we hope to have an increase of the students that select universitary studies in chemical field.

3. educational project for young people who start up in academic career. A summer school on "Educational Research and Teaching Methodology of Chemistry" will be activated from 12 to 18 of July 2009.

If we really want to change our science's teaching, we need to depend on academic people who study educational problems and cognitive obstacles of Chemistry. We also need to make the university a place where any school teachers can cooperate, dialogue, think about our science, about its basic notions and how to transfer them.

Activities of the National Chemistry Society

The 16th National Congress on Chemical Education took place in Genoa (7-9 July 2007). One hundred and fifty teachers and several experimental sciences teaching methodology's experts attended the congress. Several regional projects were devoted to the improvement of chemical education and many refresher courses took place in several regions.

A summer school (SPAIS, Standing School for the updating of science teachers) took place in Agrigento (Sicily) from 27 to 31 of July 2008 and 50 teachers attended it.

Some Italian teachers participated in the international project Science On Stage.

Publications

The main chemical education publication is *Chimica nella Scuola*, which continues the publication of five issues a year.

Aldo Borsese & Liberato Cardellini