

PREFACE

While the communiqués issued at the biennial meetings of education ministers define the Bologna process and its progress, much of the detailed work necessary for its implementation is carried out in the series of Bologna Seminars. These produce recommendations which can be passed on to the academic and ministerial community and where necessary to the Bologna Follow-Up Group, the body which is charged with "the overall steering of the Bologna Process and the preparation of the next ministerial meeting" (Berlin communiqué 2003); this includes the preparation of draft communiqués for the ministerial meetings.

Bologna Seminars deal with many topics: thus themes such as "Improving the Recognition System of Degrees and Periods of Studies", "The Framework for Qualifications of the European Higher Education Area" and "Doctoral Programmes for the European Knowledge Society" will take place between December 2004 and February 2005.

This volume forms a record of a Bologna Seminar which was the first of its kind, as it dealt not with a general topic but with the implementation of the Bologna process at discipline level.

We must not forget that the key element in the process, "Adoption of a system of **easily readable and comparable degrees**... in order to promote European citizens' employability and the international competitiveness of the European higher education system" (Bologna Declaration, 1999) cannot be realised unless academics carry out the necessary discussions at European and not merely at national level. While such discussions are taking place within the scope of the project "Tuning Educational Structures in Europe", this project covers only selected disciplines.

We hope that the publication of the documentation of the Dresden seminar will make an important contribution to the improvement of chemistry degree programmes and their adaptation to the Bologna structures. *In addition we feel that this Seminar must act as an example which needs to be followed by other disciplines.*

We thank all who participated in the Seminar, but particularly those who addressed the meeting, gave plenary lectures or chaired workshops, and who have made this volume possible by providing records of their contributions.

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Chemistry Needs the Bologna Process

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EuCheMS (a member of AllChemE together with CEFIC and other European chemistry organisations) has 50 member societies which in total represent some 200,000 individual chemists in academia, industry and government in 36 countries across Europe. (Relation to CEFIC should be indicated) We form a single voice for this important professional community inside and outside the continent, represent our joint interests, improve the image of chemistry and support chemical education. It is thus quite clear that the future of chemical higher education, as part of the Bologna process, enjoys special attention by the Federation and we make considerable efforts to formulate solutions to issues of credit transfer, education programmes, quality control and Ph.D. degrees. Through our Division of Chemical Education we involve experts from almost all European countries in the work of continuous renewal of European chemical education and try to convince academia, students and the public of the importance and relevance of some basic recommendations, formulated by them and by others.

In the past decade the number of employees in European chemical industries has been continuously decreasing (cf. Table 1).

Table 1. Employment in chemical industry (in thousands). Source: CEFIC

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CEFIC member countries	2 298	2 218	2 153	2 112	2 085	2 070	2 040	2 008	2 000	1 983
USA and Canada	1 174	1 147	1 127	1 125	1 125	1 136	1 128	1 117	1 109	1 093
Japan	413	400	392	389	384	385	371	368	366	364

*Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, The Netherlands, Turkey, UK

The pace of this decrease has been twice as large as in North America and still larger than in Japan. This may not be fully accounted for by the decrease in the number of chemistry graduates, which cannot be called other than dramatic in some countries having highly developed chemical industries (cf. Table 2). Not only reduced career opportunities, but other reasons, like the continuous shrinking of the image of chemistry and general trends in natural sciences higher education, may explain this phenomenon. Whatever is the reason, it is clear that we have to cope with the challenge and make our best in order to reverse or at least to halt reduction of interest in studying chemistry throughout in the continent. An efficient means to reach this goal is offered by taking our share from the Bologna process. As it seems, chemistry is a field, where the three-cycle education is manageable, and though we face several difficulties and conflicts of interest throughout in Europe, the new system can be made acceptable by the broad chemical community within and outside the higher education field.

Table 2. Relative number of chemistry graduates in four European countries with strong chemical industries (source: CEFIC).

	Italy	Germany	Netherlands	UK	Total
1990	100	100	100	100	100
1991	120	119	107	116	116
1992	129	129	119	127	127
1993	161	130	135	137	137
1994	181	139	139	148	148
1995	235	137	141	157	157
1996	304	136	139	170	170
1997	299	144	121	154	162
1998	293	143	96	139	151
1999	298	139	75	148	152
2000	302	130	72	140	145
2001	267	112	66	134	133
2002	259	82	64	132	121
2003	214	63	61	108	99
2004	172	51	61	90	83
2005*	140	44	60	78	72
2006*	118	37	55	67	62
2007*	113	36	49	63	58

* forecast

In 2003, at our General Assembly in Barcelona we discussed a proposal on the Eurobachelor degree in chemistry, presented by the European Chemistry Thematic Network. We concluded that this could serve as a template within national education systems with the following aims:

- to give status to Bologna first cycle qualifications in chemistry;
- to help those institutions without previous experience of first cycle degree programmes;
- to promote transparency in degree courses;
- to promote international mobility.

We agreed to recommend that member societies should give support to the proposal for a chemistry Eurobachelor in their own countries.

In the light of the above activities it is understandable that we are indebted to the Gesellschaft Deutscher Chemiker and to the German Federal Ministry of Education and Research, as well as to the Technical University of Dresden for the organisation and continuous support of the Dresden meeting. Here we gathered with the aim to discuss problems related to the education in the first, second and third cycles or, in other words, to the entirety of chemical higher education. Establishment of the European Higher Education Area needs discussions and careful evaluation of programmes specifically related to chemistry and the conference offered an excellent opportunity for such activities. I am convinced that we were able to find appropriate solutions, which can be offered to the wider community via national chemical societies. This is not easy, but I do hope that by 2010 we can achieve the creation of an open European Higher Education Area, linked with the European Research Area, which should make European science and, in a broader sense, European economy, including chemical industries, much more competitive.

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