

## Catalysis in Switzerland

### EDITORIAL

Switzerland is a country without petrochemical resources, but traditionally with strong fine chemical and pharmaceutical industries. These conditions have greatly influenced the development of catalytic technologies in our country. The lack of a petrochemical industry has certainly slowed down progress in the early years, however, it brought the advantage that Swiss researchers had to concentrate on the application of catalysis for the production of fine chemicals, many years before this development started in other countries where petrochemistry prevailed. This situation, together with the traditionally strong synthetic organic chemistry, are probably the reasons that today Switzerland is recognized as one of the leading countries in this field of catalysis. Later, mainly initiated by the public concern about the impact of harmful wastes on our environment (dying of forests, acid rain, ozone layer, *etc.*), activities in environmental catalysis started. Connected with the activities in environmental catalysis is the research undertaken in photocatalysis and energy storage.

Catalysis, comprising homogeneous, heterogeneous, or enzymatic catalysis, is a complex phenomenon which requires strong interdisciplinary research. Consequently, progress towards a substantially improved vision of the chemistry and its practical application depends on parallel advances in several fields, such as organometallic chemistry, surface science, material science, biochemistry, reaction engineering, and theoretical chemistry.

The development of new commercial chemical processes based on catalytic technologies is predominantly the domain of industry: Multidisciplinary teams of highly trained professionals with expertise not only in catalysis but also in areas such as process control, separation and fundamental unit operations of mechanical and chemical engineering are required. The commercialization of a new catalytic process is capital intensive, and the time from discovery of a suitable catalyst for a new process to commercial plant start up generally takes several years.

Catalysis research at universities has two main functions, it has to advance catalytic science and provide suitably educated students who are capable to take a leadership in catalytic technology in the future. Fortunately, these tasks are strongly correlated; high quality research is likely to bring out well-trained students.

There is a good contact between research groups in industry and at universities, which benefits both institutions. The relationship functions on different levels, including exchange of know-how, financial support, and common research projects.

Looking into the future, many exciting challenges and opportunities for catalysis can be foreseen. Catalytic technology may help to create environmental sustainability. Increasing public concern about the effects of chem-

icals and industrial emissions on the environment calls for the discovery and development of processes which eliminate, or at least minimize, the use and possible release of hazardous materials. There is clearly room for significant environmental improvement in the fine chemical and pharmaceutical industries because, in the past, minimization of waste (molecular efficiency) was not that critical in these industries due to the relatively small volumes of materials processed and a generally more forgiving economic situation. The much higher chemical and environmental efficiency of the petrochemical industry compared to fine chemical industry is mainly the result of a greater use of catalytic technology in the former.

In order to maintain its economic competitiveness, chemical industry will need to shift to lower cost feedstocks and processes exhibiting higher product selectivity. This provides a strong incentive for increasing research efforts aimed at the discovery and development of novel catalytic processes, and the continued extension of the frontiers of catalytic science. The latter task should be the main challenge for researchers at universities and other research institutes.

This topical issue of CHIMIA is meant to supply readers a picture of the present activities in catalysis at Swiss industry and universities. It is clear that this survey of activities is not complete, however, it should reflect the general features and trends of catalysis in Switzerland.



Alfons Baiker  
(ETH-Zürich)