Messages from Berlin

The international conference "Sustainable Chemistry: the way forward" took place 24 and 25 September 2015 in Berlin. More than 170 participants from 18 countries discussed the role of sustainable chemistry - a key element in innovation and safer, more sustainable chemicals management and products worldwide, going well beyond the current understanding of "sound chemicals management".

The first day of the conference focused on

strategic approaches to accelerate sustainable chemistry

Global sustainable development goals cannot be achieved without a paradigm shift in chemicals management. As well, circular economy requires sustainable chemistry – to ensure recyclability and reuse of materials.

Sustainable chemistry clearly ranges beyond the safe use and management of chemicals and resource efficiency. The precautionary principle requires a much more holistic approach including substitution of hazardous substances and benign product design. Sustainability has to consider the total environmental and societal impacts including health and economic consequences.

Aspects of sustainability and environmental protection are fundamental themes of the chemical industry, embedded in its responsible care programs. There was a broad consensus that a circular economy requires sustainable chemistry – to ensure lower toxicity, recyclability and reuse of materials as well as prudent use of resources; e.g. maximum use of renewable raw materials. The long term objective is decoupling the increase in human well being from resource depletion and lifecycle impacts to human health and environment.

There are some crucial aspects to further develop and advance sustainable chemistry:

- <u>Understanding</u>: While there are numerous definitions and principles developed for green chemistry and sustainable chemistry, there is a need for a clearer understanding what sustainable chemistry means in practice. The development of key indicators to measure progress towards sustainable chemistry based on the three pillars of sustainability should help in this process.
- <u>Awareness</u>: Regarding the true direct and indirect costs of a product (and its processing and end of life), awareness has to be raised (including at a global level) since these costs are externalized, not counted in the true costs of a chemical, process or product. Ample analyses show the business and societal value of sustainable chemistry. Therefore, strict integration of the polluters pay principle is needed.
- <u>Communication</u>: Communicating the added value of sustainable chemistry is a key challenge, e.g. for more sustainability in supply chains. Beyond the chemical industry itself, the customers and suppliers as part of the value chain become increasingly important actors to advance sustainable chemistry.

- <u>Business</u>: Sustainable chemistry business cases should go beyond a minimum sound management of chemicals and address an innovative design of chemicals, products and processes.
- <u>Policy</u>: There is an important role for policy in stimulating innovation in sustainable chemistry, from regulations requiring the substitution of substances of concern – including its enforcement all over the world – to research, development and investment policies.
- <u>Science</u>: There is a need to embed sustainable chemistry in education, from the earliest levels of primary and secondary education, through university chemistry curriculum, includ-ing laboratory courses.
- <u>Cooperation</u>: To advance sustainable chemistry, greater international and cross-sectoral collaboration is necessary. Germany will set up an International Sustainable Chemistry Collaborative Centre (ISC₃) by 2017 in order to foster international cooperation and exchange in this field and drive sustainable chemistry on a global level.

The second day of the conference featured

successful business cases of sustainable chemistry

Companies with close consumer relationships (like the apparel sector) have developed their own certifications for sustainable products, in order to communicate sustainability in a way the end consumer easily understands. Additionally, this allows the suppliers to better understand the needs of their customers.

For those companies creating the building blocks of sustainable chemistry (e.g. from renewable feedstock), demonstrating improved performance and innovation compared to conventional feedstocks is the door opener to discuss the sustainability aspects of their chemistries, given the incumbency of existing chemistries in the marketplace. Sustainable chemistry must combine improvements in environmental impact with improved performance and cost-efficiency.

For downstream companies, particularly retailers and brands, sustainable chemistry is not their main business. However, it is needed for the products they source or sell to be sustainable. Therefore, they expect the chemical experts from the chemical industry to take the lead in developing and offering more sustainable solutions.

As consequence, sustainable chemistry must look not only at the assessment or substitution of a single substance but also on the whole processing and life-cycle of products. The functionality offered by a chemical and how that function can be provided in a way that improves performance and reduces environmental impacts at lower costs is a key aspect. Additionally, high technology applications are needed to achieve substantial increase in efficiency.

Win-win-situations for supplier, user and health and environment can also emerge from innovative business models such as chemical leasing: This can result in reduction of chemicals used (and raw material), waste, water and energy in production processes. Savings in costs are shared between the supplier of the service and the customers.

Innovative entrepreneur companies have an important role to play in the transition of chemical industry to sustainable chemistry. Start-ups combine groundbreaking scientific research with specific technological progress for disruptive innovations. These young enterprises aim at the reduction of expensive and harmful chemicals, the use of bio-based materials as well as the recycling and reuse of materials.

The conference clearly showed that more sustainable design and production of pharmaceuticals and a sustainable pharmacy are needed and that this important issue should be further dealt with under SAICM.

The way forward

For the next steps in getting forward and mainstreamed, sustainable chemistry needs

- more science with the clear requirements of sustainable chemistry,
- more anticipation of regulation in developed countries,
- more policy structures that support sustainable chemistry in developing countries and countries with economies in transition as well as
- more interest of the public, educational institutions, and investors regarding sustainable chemicals innovation.

In order to approach the sustainable development goals including the SAICM 2020 goal, significant steps in sustainable chemistry are required. Important building blocks will come from the areas of investment, policy and education.

Simultaneously, downstream users, retailers and consumers become more important. Transparency and availability of information in supply chains play a crucial role. And more sustainability also needs more training and awareness rising.

Generally, sustainable chemistry has gained enough momentum to be strengthened, promoted and implemented further on the global level and to result in a significant impact to reach the sustainable development goals.

In spring 2017, Germany will host an international congress in Berlin on the occasion of the opening of the International Sustainable Chemistry Collaborative Centre (ISC₃). Germany invites the international sustainable chemistry community to contribute in this event in order to create a quantum leap towards sustainable chemistry.