

International Conference on Green Chemistry

5./6th November 2018, Vienna, Austria

Conclusions by the Organising institutions

In her opening speech, Ms Köstinger, the Austrian minister for sustainability and tourism, reminded the audience that we live in a world impacted by human activities at a global scale, which makes the protection and preservation of the world's resources a top priority. Production of consumer goods is closely related to chemical processes. The Austrian presidency, together with their partners – UNIDO, EEA, the Austrian Environment Agency and the International Sustainable Chemistry Collaborative Centre (ISC3) – found it the right time for gathering scientists, stakeholders, green chemistry start-ups and policy-makers to discuss best strategies for the incorporation of the objectives of sustainability and green chemistry in the European Union's chemical policy. This would, Ms Köstinger concluded, "make our society fit for a life with products in a less toxic world".

The conference's first session set the scene by focusing on the eminent role and impact of chemistry in the global world. The speakers, emphasizing the enormous relevance of chemistry for the manufacturing of consumer goods – over 95% of goods being directly linked to chemicals or chemical processes –, referred to the global Sustainable Development Goals developed by the UN as the prime political basis for risk reduction management. They called for an urgent shift from current business models, which dominate the chemicals industry and which rely on non-renewable sources and the paradigm of unlimited growth of production and consumption, towards alternative approaches. These should not just ensure a sound management of chemicals around the world, but also respond to the other relevant objectives of sustainability, ranging from the abatement of climate change to the achievement of social equity and a fair sharing of world's resources. Hans Bruyninckx, from the European Environment Agency, referred to the simple formula *Risk = Hazard x Exposure*. He made it crystal-clear that, if we wanted to reduce the risks from chemicals in a world set to increase its production in mere response to the increase of population, we have to reduce sharply the hazard by shifting to safe-by-design chemicals and a reduction of complexity. Stephan Sicars, from UNIDO, advocated the concept of circular economy as a fundamental new model for future consumption patterns. He presented Chemical Leasing as a concrete application of this concept, which follows from the idea that the supplier of a substance provides the functionality of a chemical rather than the chemical itself thus implementing resource efficiency as an economically driven goal throughout the supply chain.

The second session of the conference was devoted to the science of green chemistry and key research areas such as the development of green solvents, catalysis or the use of waste biomass such as lignocellulose or carbon dioxide as renewable chemical resources. John Warner, one father of the paradigmatic “Twelve Principles of Green Chemistry”, emphasized, with some scepticism, that to change the minds of chemical academia towards sustainability, fundamental changes in the education system would be needed. Universities in the USA alone award annually 15,000 undergraduate, 3,000 masters and 3,000 doctoral degrees, respectively, but most of them are apparently not required to demonstrate sound knowledge regarding toxicity or environmental impact of chemicals! Thus, inclusion of the subject of green chemistry in chemistry curricula should be the order of the day. Thomas Rosenau, from BOKU University Vienna, reasoned that for the transition of the global chemical industries from fossil to renewable resources, fundamental research and the development of reliable analytics and physicochemical characterization of new materials would be essential, using the example of lignocellulosics as chemical feedstocks. Valuable further insight into aspects of renewable resources, including carbon dioxide, were obtained from the presentations on catalysis as a key-technology by Liang-Nian He, from Nankai University, China, and Matthias Beller, from the university of Rostock, Germany, who both provided various and fascinating examples of their research. Philip Jessop, from Queen’s University in Canada, convincingly argued that the term “green” does not have an absolute meaning, but makes sense only in comparison of two different approaches of which one might be measured as “greener” than the other, and he exemplified this point by presenting amazing results from his research on “greener” solvents. In her presentation, Ann Blake, from Environmental & Public Health Consulting in California, USA, provided examples for Green Chemistry metrics, and strongly suggested that green chemistry research and practice demonstrate their ability to contribute to both carbon drawdown for climate mitigation and the bio-economy through the framework of the UN SDGs.

The final session of the conference focused on current approaches of chemical’s management within the European Union and perspectives for integrating concepts of green chemistry and sustainability into that policy. Kestutis Sadauskas, from the European Commission, and Bjorn Hansen, from the European Chemicals Agency, referred to the key results of the recent review of the REACH legislation and identified circular economy and progressive substitution of unwanted chemicals as the most challenging issues for European’s chemicals policy. Martin Führ, from Darmstadt University of Applied Sciences, accentuated in his presentation the “delta analysis” between the current chemicals’ legislation and the principles of Green Chemistry and emphasized the high importance of learning processes for the establishing of an innovation driven system. Research is key to drive innovation, said Jochem van der Waals, from the Dutch Ministry of Infrastructure and Water Management, and he summarised the status of the “Safe Chemicals Innovation

Agenda”, an initiative targeted to incorporate green chemistry concepts into European Research programmes. Finally, Achim Halpaap, from UN Environment Programme, reconnected the European dimension with the global one, reminding the audience once again of the key role of green chemistry in the achievement of worldwide sustainability goals, and he discussed enabling factors to advance sustainable chemistry, such as education and finances. Friedrich Barth, Managing Director ISC3, presented this Germany-based new and independent institution, which aims to support sustainable chemistry innovation, intelligent solutions and business models as key contributions to global sustainable development.

Each session was rounded by a plenary discussion and a question and answer-session involving the audience. As a final event, eight start-ups in the field of Green Chemistry introduced themselves and presented their products. Werner Wutscher, from Vienna-based New Venture Scouting, in his introductory keynote compared start-ups with speed-boats which, due to their high flexibility, fast product development and close proximity to customers, would be significantly more innovative than the “supertankers”, the big chemical companies. A pitching session by several invited start-ups showed the broad variety of products, ranging from green bulk materials over cellulose-based fibres to fabrics for the textile industry or wood-based construction materials, and again proved the huge relevance of chemistry to many fields of consumption.

In the social side-event, Professor Nuno Maulide, from the University of Vienna, chemist and gifted pianist, entertained the participants with a presentation about the analogy between chemical science and art of music. Providing fascinating samples of classical piano masterpieces, he demonstrated that for both disciplines imagination is the ground of creativity. In a sense, he captured the whole atmosphere of the conference, echoed in the positive reactions of the participants to his performance.

Overall, this conference clearly highlighted that green chemistry is a key approach to integrating resource efficiency into chemicals policy as a whole, thus making it corner stone of a circular economy.

Vienna, 27th November 2018

This conclusion and all presentations are available on the Website of the conference <http://www.greenchemistryvienna2018.com/>.



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