



The year 2022 marks 50 years since the historic United Nations Conference on the **Human Environment** held in Stockholm. This conference started the United Nations Environment Program (UNEP) coordinating the global effort to deal with environmental problems.

For implementing the sustainable development, in 2015, the United Nations General Assembly adopted a new program, including 17 sustainable development goals (SDGs) for a healthy planet, and prosperity for all. Adopting of the SDGs generated a framework for national actions and global cooperation.



The objective of UN has been to create a connection of all efforts to support the SDGs, strengthening the sense of work toward the same objectives. The SDGs focus on the following targets: Prosperity, People, Planet, Peace and Partnership, known as the five Ps.

*“Green and sustainable chemistry and engineering is going to play a key role in making sure the goals address the broad categories of ending poverty, fighting inequalities and injustice, and tackling climate change.”* (A.M. Noce, CEN.ACS.ORG | C&EN, May 28, 2018, p 43).

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## New challenges in environmental chemistry

Earlier this year, the new updated sixth report from the Climate Panel (IPCC) was presented to the public. Through this comprehensive international collaboration, several hundred researchers presented their professional conclusions about the status of the globe's climate situation; it is very clear that humans' global footprint is enormous and affects all environmental processes today. However, also our local surroundings are directly affected by human activities and often in a negative way. Humans created many toxic chemicals which may ultimately be released into the environment, plastic islands are reported in the world's oceans, including patches along our coast. These observations impressively testify about the negative consequences of uncontrolled waste discharges on a global scale.

This type of huge environmental impact is largely due to today's "use-and-discard" culture in our western societies, where not only goods and services, but also the spreading of pollutants is globalized to a greater extent. Waste from densely populated regions is transported for further treatment, storage, or destruction over long distances even to developing countries, where less stringent environmental laws are often applied. The transport of pollutants beyond the borders of local environments is known for more than 50 years already. Ever since the industrial revolution, the chemical industry has caused many environmental challenges to societies and the world's environment.

In the 1970s, long-distance air pollution from Europe (mainly sulfur dioxide) led to acid rain and massive fish deaths in Scandinavian freshwaters environments. In the period 1950-1970, many agricultural chemicals were used uncontrolled and often in an unwise manner, which i.a. led to a drastic decline in the bird populations, incl. peregrine falcons and sea eagles in Europe and the North Americas. And in recent times, contamination with the non-steroid anti-inflammatory drug (NSAID)

diclofenac has almost wiped-out vulture populations in some regions of India and Pakistan.

In general, the application of chemicals, meet the needs of societies and contribute to our current lifestyle. Production of various types of chemicals, thus, is an important part of today's economy and quality of life in society. Many of these end products have, thus, been in demand and filled needs that have ultimately improved the standard of living for many, but the polluting properties were usually unknown when production started. Visible examples where these substances are used today are textile production, medicines, pesticides, furniture, electronics, and plastic products; less visible but equally useful are flame retardants, plasticizers and food additives. By using such products, the consumer comes inevitably into contact with hundreds of chemicals daily without being aware of it.

### The reverse side of the medal

Even though all these chemicals are coveted aids for our society, it has often been shown that current knowledge of their properties has not been good enough to assess indirect effects. As documented in early environmental studies, often harmful effects are often only confirmed after prolonged use. Dichlorodiphenyltri-chloroethane (DDT) which after World War II was widely used as a pesticide in agriculture but specially to combat malaria by targeting the disease carrying mosquitoes. The use of *p,p'*-DDT helped to improve production yields, reduced the presence of pests and contributed to better quality of life of consumers. However, in the 1960s it was discovered that DDT's most important degradation product *p,p'*-DDE (dichlorodiphenyldichloroethene) is stable in the environment and is accumulated in the food chain up to very high concentrations. High *p,p'*-DDT and *p,p'*-DDE concentrations in many raptor populations contributed to egg shell thinning and a strong population reduction of hawk and golden eagles, peregrine falcons and hawks throughout Europe. Through national and international regulations, the use of DDT was therefore severely restricted in the early 1970s

and eventually banned through the UN Convention on Global POP Regulation (Stockholm Convention). but this quickly resulted in the rise of malaria. Therefore, DDT was again allowed as an anti-malarial agent in tropical areas under strongly controlled conditions. This re-introduction of DDT was done even though it was then known that the substance is transported by air and ocean currents to the polar regions where it will also accumulate, but no other effective remedy for malaria is still available with similar efficiency. One dilemma was clear: Either it must be accepted that people are infected with malaria and die in the tropics to protect the environment in polar regions, or it must be accepted that the food of the people in the northern areas is contaminated with an environmental toxin to prevent malaria infection. Similar ethical dilemmas apply to many chemicals, such as medicines and personal care products.

#### Chemicals in medical use

Today's pharmaceutical industry makes up a large part of the international chemical industry, but the chemical industry is not yet focusing on post—application consequences such as environmental pollution. One reason is that this industry in general has been cleaner and more subject to very extensive quality assurance than other parts of the international chemical industry. In addition, drug residues are still considered to be readily degradable and not mobile in the environment. Today we know that a large part of bioactive substances in therapeutic applications pass the body unchanged, excreted and reach the environment unchanged through urine and feces. More often, environmentally stable degradation products are produced. Such drug residues (as single compounds or as mixtures) may have significant negative effects on the environment, similar to other conventional pollutants. But the western societies accept such unwanted effects obviously because drugs are so important to human health and well-being. In the long run, however, this is not an acceptable path, and it is therefore important that the environmental aspect is considered to a greater extent when new medicines are to be produced, marketed, and approved.

#### Green production of chemicals

Ever since the beginning of the industrial revolution in the 19th century, the chemical industry has been one of the most polluting with significant environmental consequences. But this was accepted and sanctioned by the society and the regulatory authorities since chemical products were and still are an important pillar of our standard of living. Therefore, it is unrealistic to believe even today those man-made chemicals will be removed on a large scale to solve pollution problems. However, knowledge of the properties of chemicals can be used to develop smarter and greener production processes that lead to reduced environmental problems. After much public discussion and regulatory action by the authorities, there is today a strong progress in the industry which has already resulted in much lower consumption, production, and emissions of polluting chemicals because high-volume production of harmful chemicals has been optimized and toxic chemicals have been replaced with more environmentally friendly options. The strategy in this work is based on the principles of "green chemistry", which has become a significant field of research in recent years. To date, there are over 190 million man-made chemicals, of which more than 40 million are in use in various commercially available products. But only about 350,000 of them are regulated in terms of use and application (CAS registry). To avoid future environmental problems, it is important for chemicals to be used in high-volume industrial production to be carefully mapped and the environmental consequences to be duly assessed before they are used. This line of thinking is the basis for the European Chemicals Regulations Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), which increasingly now regulates the EU chemicals policy (since 2007). According to REACH, the chemical industry is required to document chemical properties and environmental effects for chemicals produced annually with more than 10-ton production volume. This also includes degradation pathways and possible emission sources. Chemicals that do not meet the REACH

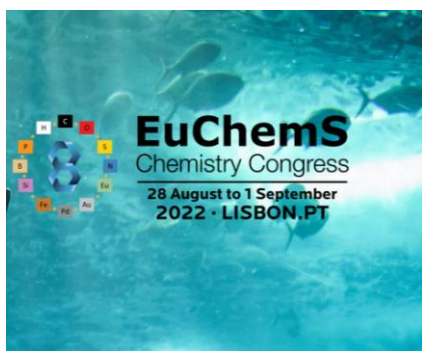
requirements are not permitted for commercial applications.

#### Useful chemicals or environmental toxins?

Today, both in society and in science, various possibilities for achieving a "zero emission" scenario for environmental toxins in the future are being discussed. Is it possible that we could envision a future without problems created by chemicals? Without the development of the global chemical industry, this could never happen. Chemical production is important for safeguarding today's society. We need energy, water, food, and medicine, which unfortunately cannot be obtained without the use of chemicals. Therefore, it is important to find new ways to avoid or reverse such environmental problems. Extensive knowledge of environmental challenges and research in chemistry is important to identify and solve environmental problems and ensure that technological development does not lead to new pollutants.

*Prof. PhD Roland Kallenborn, member of DCE, Faculty of Chemistry, Biotechnology and Food Sciences (KBM), Norwegian University of Life Sciences (NMBU)*

### News from the DCE Conferences



The Slovenian Chemical Society (<http://www.chem-soc.si>) has established a Section on the Environment. Its mission is to encourage cooperation, networking and exchange of experience between experts from various fields of chemistry to raise public

awareness of current environmental issues. It will also promote the use of chemistry to address important aspects of environmental chemistry that require regulation, integrate advances in environmental chemistry into the educational system and cooperate with an international environmental organizations. This newly established Section will also participate in this year's Slovenian Chemistry Days (<https://skd2022.chem-soc.si/>).



The conference was held in Portorož, Slovenia, as a three-day scientific event (21. - 23. September 2022) consisting of plenary lectures, lectures and poster presentations. A competition for the best student scientific paper was also organized. An expert committee will select the winner. The conference was accompanied by an exhibition of Slovenian manufacturers and suppliers of laboratory equipment. The official languages of the Slovenian Chemistry Days 2022 conference are Slovenian and English, and because of the presence of many foreign delegates, the contributions were presented in English.

On 23.9.2022 a plenary lecture entitled "Arsenic removal from drinking waters: experiences with applied technologies and proposals for novel approaches" was given by Prof Ioannis Katsoyiannis, Chair of DCE at EuChemS.

INVITATION TO 22nd Meeting on  
environmental Chemistry, **EMEC22**,  
Ljubljana, Slovenia  
<https://www.emec22.com>



EMEC22 will take place onsite from the 5th until the 8th of December 2022, as this

period is traditionally reserved for EMEC conferences around Europe. During these four days a broad range of topics will be covered in scientific sessions in the form of oral presentations and poster sessions and invited lectures

*Prof PhD Ester Heath, Member of the Scientific committee of EMEC22. Member of DCE*



**Kujawsko-Pomorskie Forum of Innovation, Science, Business and Local Government.**

*FINBiS 2022 is a science and technology event dedicated to new technologies, innovations, inventions and cutting-edge investments changing the country and region based on smart specialisations. The leading topics of discussion will be the challenges of innovators in transferring knowledge from the science sector to business and successfully launching new or improved products and services. Kujawsko-Pomorskie Forum of Innovation, Science, Business and Local Government 2022 – a conference promoting regional scientific, innovative potential and business cooperation within all sectors relevant to the development of the voivodeship, as well as the world. The project includes discussion panels, meetings dedicated to specialists of key importance for the development of the region and the country, as well as meetings and events promoting cooperation between science and business with the support of local administration.*

*The initiator and organizer of the event is the Jan Czochralski Kujawsko-Pomorskie Science and Technology Center supported by a recognized, experienced, regional business environment institution - Toruń Regional Development Agency. The Strategic Partner of the event is the Kujawsko-Pomorskie Voivodeship.*

*Conference chairman:  
Prof. dr hab. Bogusław Buszewski  
Chairman of the Board of the Jan Czochralski  
Kujawsko-Pomorskie Science and Technology Center*

*Save the date !*

**Filmar Hotel, Toruń  
November 6–8, 2022**

***The Norwegian Environmental Chemistry Symposium***

**Vestlia Resort, Geilo, Norway  
January 30 – February 1, 2023  
[www.envirochem.no](http://www.envirochem.no)**



FIRST ANNOUNCEMENT  
THE 18<sup>th</sup> EUChemS INTERNATIONAL CONFERENCE ON CHEMISTRY AND THE ENVIRONMENT  
VENUE: UNIVERSITY CA' FOSCARI OF VENICE (ITALY)

11-16 June 2023

RESERVE THE DATE ALREADY NOW AND FOLLOW [www.icce2023.com](http://www.icce2023.com) FOR CONTINUOUS UPDATES.



**Topics:**

- Analysis and modelling of environmental pollutants,
- Impacts of climate change,
- Nanomaterials,
- Micro- & nano- plastics,
- Air & water pollution,
- Environmental risk & impact assessment
- Water and wastewater treatment,
- Biotransformation of organic pollutants,
- Green chemistry & eco-toxicology
- Priority & emerging pollutants,
- Circular economy, LCA & sustainability,
- Environmental impacts on cultural heritage,
- University education,
- .... and other important topics.

**Abstract submission from November, 1<sup>st</sup>, 2022 [icce2023.com](http://icce2023.com)**

**Short Report from the General Assembly of EuChemS 2022**

The General Assembly (GA) of EuChemS took place in Lisbon on 26th and 27th of August, before the 8th EuChemS chemistry congress (ECC8). On the 26th of August, the GA elected the new president and Treasurer of EuChemS. The President elect is Professor *Angela Agostiano*, professor of physical chemistry at the University of Bari and member of Academia Europaea.



Professor Agostiano was in the past president of the Italian Chemical Society (SCI). Professor Agostiano will serve the first year as president elect, then 3 years as president and finally 2 years as Past President.

Treasurer of EuChemS was elected Professor *Hans Peter Luthi* from ETH Zurich and past treasurer of the EuChemS division of theoretical and computational chemistry.



On the 27th of August, during the open session of the GA, the main issue discussed was the establishment of a European Chemistry Day. The discussion was very interesting, a lot of members expressed their opinions about the way the European Chemistry Day should be organized and the possible date.

The decisions will be taken in an upcoming meeting of the Executive Board of EuChemS. On 27th of August, was held also the 2022 annual meeting of professional networks. The next year GA will take place in Cyprus.

*Ioannis Katsoyiannis, Assoc. Professor, Department of Chemistry, Aristotle University of Thessaloniki; Chair of the Division of Chemistry and Environment of European Chemical Society*

## **DCE publication**

### **Environmental Science and Pollution Research (ESPR)**

*A scientific journal with a broad interdisciplinary outlook.*

**5.190 (2021) IF**

**Editor in chief:** Philippe Garrigues



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