

Interdivisional Committee on Green Chemistry for Sustainable Development, ICGCSD

Statement

Green Chemistry and IUPAC

Increasing Importance of Green Chemistry

The concept of Green Chemistry was introduced in 1996. It aims at finding synthesis procedures and chemical products that would prevent pollution and environmental hazards. IUPAC adopted the Green Chemistry concept in the late 1990ies through the "Subcommittee on Green Chemistry", and since 2017 as "Committee on Green Chemistry for Sustainable Development". It is noteworthy that the first world conference on Green Chemistry was sponsored by IUPAC (President Albert Fischli, Venice, September 28th - October 1st, 1997); and that the IUPAC Workshop on Green Chemistry Education was held in Venice on the late September 12-14, 2001.

Meanwhile Green Chemistry has been evolved all over the world. While originally focused on mass-economic and non-toxic synthesis, the term is now used in a wider sense, including environmental degradability, recyclability, chemical waste management and conservation of natural resources. At present, various governments see Green Chemistry as the ideal tool for realising their particular sustainability needs. Different countries have different problems to solve; thus, decision-makers all around the world have high expectations for the science of chemistry, since they believe that their problems can be solved by novel chemical approaches. This is an emergent, positive and unexpected benefit.

The increasing importance and recent development of Green and Sustainable Chemistry cannot be attributed solely to the intuition that the pioneers of the field had 25 years ago, rather it comes from the increasing international agreement and support, which underpins the Green and Sustainable Chemistry concept as an ideal tool for realising green and sustainable principles, and for solving regional problems.

Accordingly, Green Chemistry might be seen as the field in Chemistry which directly responds to the requests of humankind. Green Chemistry is a future-oriented approach to reconcile and foster the research in the chemical sciences with society and its needs.

Green Chemistry and the Need for Chemical Research

History shows that fundamental research can hardly be restrained by conventions, since it obeys different principles.

At the same time, chemical applications must be adapted to today's global environment, and the need to support Sustainable Development (SD). So, we necessitate as many new and surprising proposals coming from pure and applied research as possible in order to have the possibility to select the best solution. Because most items of modern life are dependent or connected with chemistry, the scientific contribution of Green Chemistry will be essential for global SD.

The question arises, who will keep responsibility to give an answer to the humankind and to give a worldwide guidance for a sustainable chemistry development into the future? No industry with its great responsibilities, no national chemical societies, no federal agencies or NGO alone.

IUPAC and Green Chemistry

IUPAC as a globally active Union of Chemists has a long tradition, it facilitates international networks and has the mission to foster sustainable development. IUPAC has the goal to "... provide objective scientific expertise and develop the essential tools for the application and communication of chemical knowledge for the benefit of humankind and the world."

However, at present it is unclear whether IUPAC has the capacity to take on the role of an independent, scientific network in green chemistry in order to become the authoritative organization that we would be proud to be. If not, IUPAC's reputation may suffer amongst our NAOs.

Two main areas of participation are evident:

Education:

The experience from the 12 summer schools on green chemistry, held from 1998-2019 with more than 1000 students attending, tells us that young people are particularly interested, because they look at Green Chemistry as a means to invest their talent at a particular, strategic moment of their lives. Green Chemistry is a good key for students to look around the scientific disciplines and to decide how and where to go forward. At the same time, the interaction with their experienced peers is necessary to initiate good research practices and select useful practical solutions and to disseminate confidence in Science in their respective countries. Nowadays, Green Chemistry is adopted in many school curricula and has dedicated Masters programs.

Cooperations:

While we pay attention to the increasing emission of CO₂ and the increasing number of new chemical compounds that are spreading in the environment, it is difficult to foresee an end to this sinister and destructive trend, if humankind does not consider the prevention of negative consequences of rapid industrial developments; nature is not in a hurry but humankind is.

More than other professions, chemists have knowledge of materials and chemical properties, and thus great responsibility for recognizing harmful compounds and avoiding damage to the environment. A new partnership is necessary among academic, governmental and industrial researchers, to share available knowledge bases and cooperate in the management of sustainable development related issues.

A direct connection and shared responsibilities should be established among IUPAC and Industry for sustainable development to be pursued.

Considering the side effects of chemical output on sustainability, we propose that a small portion of profits from industrial activities be reinvested in sustainable development for humankind. A few industries have already indicated that it is possible to invest up to 5% of their revenues in research and collaboration with academia in green chemistry and sustainable development. This figure might be reasonable given that chemical industry increases constantly and very considerably its business year after year.

Green Chemistry, in this way, will be a benefit for sustainable development and for humankind.

Moreover, international organizations as the Organisation for Economic Co-operation and Development (OECD), the Organisation for the Prohibition of Chemical Weapons (OPCW) and the International Sustainable Chemistry Collaborative Centre (ISC₃) support projects and activities in Sustainable Development and Green and Sustainable Chemistry as IUPAC did and does. These organizations are valuable partners, but also potential competitors if we work in isolation. IUPAC must find a new capacity and open a dialogue with them.

The Sustainable Development Goals — our shared vision to rescue the planet and build a peaceful world — are gaining global momentum. Green chemistry is a powerful tool to move the 2030 Agenda for Sustainable Development forward; to eradicate poverty; to mitigate the impacts of climate change; for human rights and dignity. This calls for innovation at every level and in all associated processes.

With just 10 years to go, an ambitious global effort is underway to deliver the 2030 promise—by mobilizing more governments, civil society, businesses and calling on all people to make the Global Goals their own.

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Chair of ICGCSD

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