

Chemistry for Sustainable Development

Chemistry has undergone major transformations over time, but none of them has as significant an impact as the search for sustainability throughout the entire chemical processing industry. The challenges presented here remain daunting, such as in the cases of replacing fossil fuels by fuels of sustainable origin, homogeneous by heterogeneous catalytic systems whose residues are not harmful upon disposal, and conventional by biocompatible solvents that are environmentally friendly. No less important are its endeavors oriented to change crude oil-based plastics by biodegradable and biocompatible materials for packaging and other applications and to move from edible raw materials to alternatives that do not compromise food security, among many other relevant examples. Also, sustainable waste management is another significant challenge because we are still tolerant of several precepts of linear economy, which are led by the ‘take-make-dispose’ concept, whereby natural resources are turned into products that are ultimately destined to become waste as time goes by.

By contrast, the novel concept of circular economy is based on an industrial system that is regenerative by intention and design. According to the World Economic Forum’s definition, “the circular economy replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems, and business models”. Biorefineries are key enabling strategies for the establishment of circular economy because they are projected as close loops involving biomass, minerals, water, and carbon, resulting in the cost-competitive co-production of food, feed, pharma, bioenergy, and biobased materials with low environmental impact and optimal socio-economic benefits. To this end, greener methods for organic synthesis, extraction, and fractionation, as well as more eco-conscious chemical analysis and environmental management are in utmost demand.

Once blamed for the environmental impact of the industrial revolution, chemists are now called to develop new strategies to mitigate the polluting potential of chemical processing, while ensuring economic growth. For this, the precepts of bioeconomy and biorefining must be followed; these are very well defined in the basic rules of green chemistry and green engineering, concepts that are well disseminated among the scientific community, but not as much in the chemical industry.

This JBCS Special Issue is part of the Brazilian Chemical Society (SBQ) “Post 2022 Chemistry Movement – Sustainability and Sovereignty”,¹ launched by the SBQ in mid 2021 considering the bicentenary of Brazil’s Independence in 2022 and the unique UNESCO initiative to celebrate 2022 as “The International Year of Basic Sciences for Sustainable Development”.² Under the proposed theme of “Chemistry for Sustainable Development”, contributors

from Brazil and abroad were invited to submit original manuscripts or review papers to be considered for publication in a Special Issue of the Journal of the Brazilian Chemical Society (JBCS). Hence, it compiles studies that are oriented to important areas of sustainable development, with contributions coming mostly from SBQ members.

To our greatest satisfaction and honor, JBCS invited us to act as Guest Editor and Editor in the organization and handling of this Special Issue. After a successful call, researchers from diverse fields of the chemical sciences were brought together, resulting in around 30 articles involving both original studies and reviews of high scientific and/or socioenvironmental impact. For publication, these contributions were split in two issues, in which different topics of sustainable chemistry are addressed, covering mainly aspects of “Greener Synthesis and Analysis” and “Environmental Chemistry and Biorefining”. These two issues, containing over a dozen articles each, were released during the 2022 SBQ Annual Meeting.

There is much to be done for chemistry to fulfill its mission as the key enabling basic science to secure a sustainable development for mankind. This mission requires efficient networking, vision, collaboration, and a great level of interdisciplinarity in our research endeavors, to bring sustainable chemistry to all fields involved in biorefining for fuels, chemicals and biobased materials that are bound to help us to build a strong, green bioeconomy for the foreseeable future.

Finally, we would like to join SBQ and the JBCS permanent editorial staff in thanking authors and reviewers for the excellency of their work, which helped us to keep the high standards of our journal. We are also grateful to the competent technical support of Dr Maria Suzana P. Francisco (PubliSBQ) and her staff at the Editorial Office, without whom this task would be hardly achievable; working with you and your team was not only a pleasure but a great honor that we will always cherish in a very special way.

We wish you all a very enjoyable reading.

Luiz Pereira Ramos^a

Special Issue Guest Editor

^aUniversidade Federal do Paraná (UFPR), Curitiba-PR, Brazil

Teodoro S. Kaufman^b

JBCS Editor

^bUniversidad Nacional de Rosario, Rosario-SF, Argentina

References

1. Chemistry Movement - Sustainability and Sovereignty, <http://www.s bq.org.br/mqp2022>, accessed in May 2022.
2. The International Year of Basic Sciences for Sustainable Development, <https://www.iybssd2022.org/en/home/>, accessed in May 2022.

