

How research in green chemistry could be redefined to meet the challenges identified in the IPCC's climate models, a personal interrogation from a young researcher

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How research in green chemistry could be redefined to meet the challenges identified in the IPCC's climate models, a personal interrogation from a young researcher

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From the 1960s, rising awareness on the impact of chemistry on the environment and human health led to the emergence of the concept of green chemistry, defined by Paul Anastas and John Warner in 1998 according to 12 principles.[1] Green chemistry aimed mostly at addressing pollution-related issues, and promotes the development of chemical procedures, which are atom-economical, catalytic, energy-efficient, based on renewable feedstocks, while use and release of toxic or hazardous compounds are to be reduced.

In 2021, the Intergovernmental Panel on Climate Change (IPCC) started to publish its latest reports on climate change. Five scenarios of climate change are reviewed in the Physical Science Basis report,[2] based on projected carbon dioxide emissions, leading to an estimated global warming of +1.4, +1.8, +2.7, +3.6 or +4.4 °C in the long-term (2081-2100). Consequences of those scenarios are described on the global and regional level, in terms of extreme climatic events (heatwaves, precipitations, droughts, floods), but also in terms of vulnerability of ecosystems and human systems, including food production, water availability, health, migrations, economy and infrastructures.[3]

As a young researcher in the community, I believe those scenarios and their consequences raise questions about a possible new paradigm for green or sustainable chemistry: should chemistry, in academia or in the industry, adapt to the IPCC's climate models? If chemistry should adapt, how? What consequences on the definition of green or sustainable chemistry? Using a collaborative poster as a conversation starter, I propose to all interested participants of the congress to contribute to a discussion around these issues.

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[1] a) American Chemical Society. What is green chemistry? https://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry.html (accessed April 01, 2022) b) Anastas P.; Warner J.C.; *Green Chemistry: Theory and Practice*, Oxford University Press, 1998

[2] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

[3] IPCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.