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Green chemistry and circular economy: It takes two to tango for a cleaner world

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Green Chemistry and Circular Economy are two topics in the chemistry field of wide interest today. It seems the application of their general principles to the chemical processing industry paves the way to a steep change of paradigm: chemistry, often associated to unclean and polluting production practices, now provides all tools for remediation of widespread pollution. Green Chemistry provides a specialized practice framework, based on the application of twelve golden principles outlined in 1998 by Anastas and Warner to chemical processing, but it now gives guidance to many different activities due to the growing global concerns about pollution, climate change and depletion of nonrenewable sources. On the other hand, circular economy has become a widespread paradigm to instruct production processes, so that their design should include in its own the zero-waste approach. As matter of fact, green chemistry preconized circular economy, since its first two principles told: “1. Prevention: It is better to prevent waste than to treat or clean up waste after it has been created. 2. Atom Economy: Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.” The circular economy approach, as matter of fact, strives to achieve a zero-waste goal through a complete valorization of all wastes and by-products, for all production processes (not necessarily limited to the chemical processing field). Though stemming out from a common background, circular economy and green chemistry seem to proceed in some way on parallel routes, seldom crossing. For instance, the production of biofuels from residual biomasses (a paramount circular economy application) often passes through the use of nonrenewable, hazardous chemicals, to ensure the economic feasibility of the production process. The speech will present some case studies regarding positive and negative interferences between these two fields, with a special regard to perspectives and guidance towards a growing integration in the general framework of “Chemistry for a Cleaner World”.

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