

Mechanochemical Synthesis: From Small Molecules to Cavitands

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Mechanochemical synthesis has gained renewed interest among organic chemists due to its straightforward handling and the accessibility of its tools. This approach maximizes reagent concentrations and overcomes limitations of solution-based synthesis, such as poor solubility of starting materials and reduced reactivity caused by solvation shells. It opens up new synthetic pathways that were previously unfeasible in solution, while also offering more sustainable methods.

This presentation will focus on the development of mechanochemical techniques for forming C-N (Refs. 2-4) and C-C bonds (Ref. 5), as well as the reduction of arenes (Ref. 6). These methods have proven valuable for synthesizing various products, including the active pharmaceutical ingredient (API) Imatinib (Ref. 7) and hemicucurbiturils (Refs. 2, 8, 9). Notably, one of these processes has been successfully scaled up to a multidecagram scale (Ref. 9).

Special attention will be given to critical chemical and technical parameters, quantitative reaction monitoring, and product analysis. Additionally, the sustainability of these methods will be evaluated using green metrics.

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