

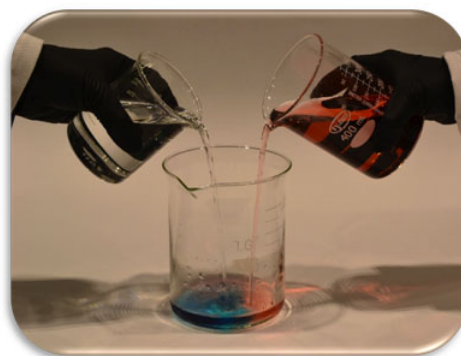
Mechanochemistry opens the door to cleaner, safer and more exciting chemistry via simplicity and minimalistic design

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Chemistry and chemical manufacturing are often associated with pollution and environmental impact, leading to a tainted view of the many benefits that chemical sciences have provided to the society. The need to resolve this conundrum has inspired *Green Chemistry*, a discipline dedicated to the development of new, cleaner and safer approaches to chemical synthesis.^[1]

Many of the goals of *Green Chemistry* can be achieved by re-considering and simplification of chemical reaction designs and strategies. In particular, the emergence of mechanochemical techniques, *i.e.* transformations induced and sustained by mechanical action in the solid state, has provided a path to reduce or even completely eliminate solvent use.^[2] Solvents have been in use for centuries, continuing a practice employed by alchemists, but are also the principal component of over 40 million tons of toxic chemical waste globally produced each year. In contrast, whereas solid-state and solvent-free transformations have been known for millenia, they were largely ignored by modern chemists.^[3]



The re-discovery of the solid state as a reaction medium, and introduction of low-solvent, low-energy reaction techniques such as mechanochemistry or accelerated aging,^[2,4] provides for the first time an opportunity to create viable, general alternatives to solution chemistry that can not only reduce the environmental impact of synthesis, but also provide a door to previously not known chemical transformations and difficult or even impossible to reach materials and molecules.

References

1. C.J. Li, *Green Chem.* **2016**, *18*, 1836.
2. J.-L. Do, T. Friščić, *ACS Centr. Sci.* **2017** *3*, 13.
3. E.R. Caley, J.F. Richards, “*Theophrastus, On Stones, Introduction, Greek text, English translation and Commentary*”, Ohio State University, Columbus (1956).
4. C. Mottillo, *Molecules* **2017**, *22*, 144.