Multicatalytic Reaction Factories: Selective Construction of Complexity

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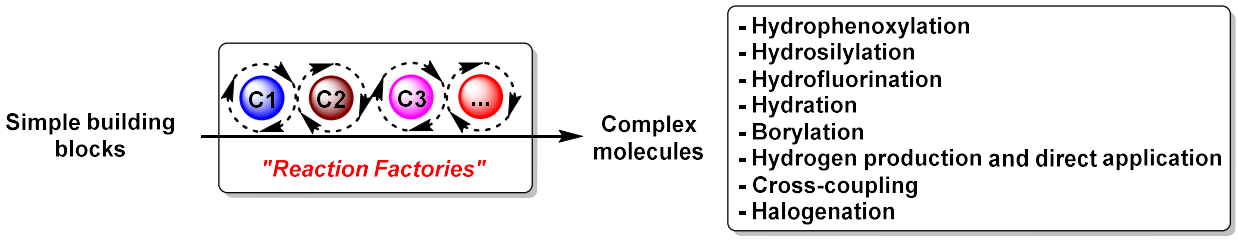
The development of new methodologies for the straightforward preparation of complex molecules, in as few steps as possible, represents a significant challenge in modern chemistry. This, in light of waste reduction and environmentally responsible science, has an immediate impact on the pharmaceutical, medicinal and fine chemical industries. Catalysis is a key technology to achieve this goal, especially in terms of atom economy and efficiency. In this context, the simple and efficient synthesis of organometallic complexes acting as catalytically active species is central to any development in metal-based catalysis. These are simply the tools required to "*get the job done*".

The ideal aim would be to develop methodologies that would allow the construction of increasingly complex molecules and building blocks with the minimal number of steps (ideally one step).[1-4] This one-step or even one-pot approach to catalysis, tentatively named "***Reaction Factories***", are considered environmentally-friendly and will have a huge impact on reaction- and cost-efficiency. This is achieved by reducing the number of steps and consequently the amounts of solvent, reagents and purification techniques necessary to obtain the final product. The impact on the industry and academia will be significant since the aforementioned variables are the most expensive parts of any particular reaction.

To this end, several multicatalytic approaches have been developed and successfully implemented to a number of important transformations and a wide variety of substrates using different metal-NHC complexes (NHC = N-heterocyclic carbene).[5-11] This field of research is ever-growing and the emerging multicatalysis concepts have the potential to access transformations that are difficult or even unattainable using traditional catalysis.



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