Cobalt(I)-catalyzed synthesis of β-functionalized-carboxyl compounds

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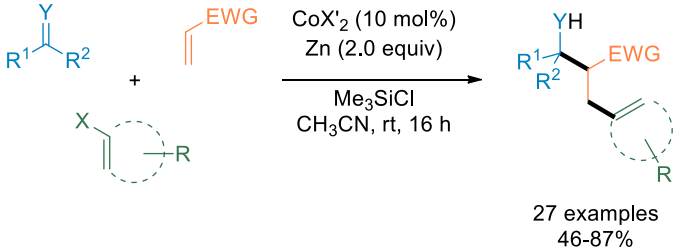
Multicomponent reactions (MCRs) involving organometallic species constitute one of the most powerful tools in organic synthesis because they combine the benefits of organometallic chemistry and multicomponent reactions. Highly substituted scaffolds can thus be easily obtained from simple substrates, constituting a privileged strategy for the development of eco-compatible organic chemistry. More precisely, our group focused on MCRs involving organozinc species generated from organic halides and zinc, eventually under Co-catalysis and/or Barbier conditions.

A few years ago, we reported a new four-component reaction for the synthesis of $\beta^{2,3}$-aminoesters.[1] In this approach, various halides, acrylates, aldehydes and secondary amines were combined thanks to the initial *in situ* formation of an organometallic species by a Co(II)/Zn catalytic system. However, these reactions were restricted to the use of highly reactive iminium and only tertiary amino esters could thus be obtained.

Therefore, a complementary three-component variant of the reaction using an aldehyde or an activated imine as the electrophile has been developed (Scheme 1).[2] The development of new reaction conditions has allowed an important increase of the overall eco-compatibility of the process as well as an expansion of the scope of the reaction. This methodology afforded an efficient and straightforward access to diverse $\beta^{2,3}$-hydroxy- and -aminocarboxyl compounds in good yields. This methodology could be further extended to the use of preformed organozinc reagents and to the development of an intramolecular version.



Scheme 1: 3CR for the synthesis of β-functionalized-carboxyl compounds

[1] Le Gall, E.; Léonel, E. *Chem. Eur. J.* **2013**,*19*, 5238.
[2] Paul, J.; Presset, M.; Cantagrel, F.; Le Gall, E.; Léonel, E. *Chem. Eur. J.* **2017**, *23*, 402.