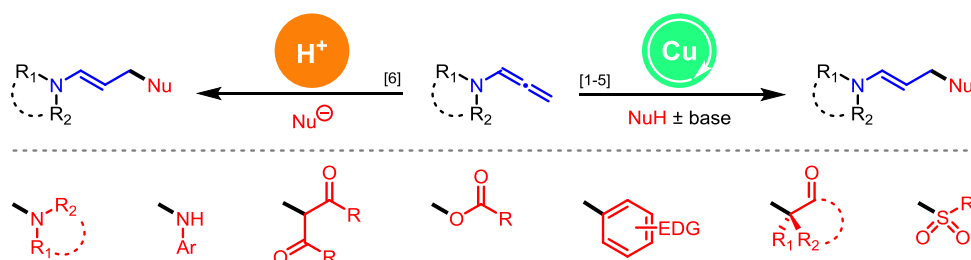


COPPER-CATALYZED OR ACID-MEDIATED HYDROFUNCTIONALIZATION OF TERMINAL *N*-ALLENYL DERIVATIVES



Lucas PAGÈS, Sébastien LEMOUZY, Racha ABED ALI ABDINE,
Rémi BLIECK, Florian MONNIER and Marc TAILLEFER.

Institut Charles GERHARDT Montpellier (UMR 5253 CNRS-UM-ENSCM)
1919, Route de Mende - 34293 Montpellier, France



Hydrofunctionalization of unsaturated C-C bonds is a powerful tool in organic synthesis. In recent years, we have engaged our efforts in the hydrofunctionalization of terminal allenes, in particular terminal *N*-allenyl derivatives. We have successively developed several systems based on simple copper catalysts allowing the addition of various nucleophiles such as secondary amines and anilines¹, 1,3-dicarbonylated derivatives², electron-rich aromatics³ as well as carboxylic acids⁴. We also designed a synergistic copper/enamine system allowing the regio-, stereo- and enantioselective α -addition of aldehydes or ketoester nucleophiles to similar terminal *N*-allenyl derivatives⁵. These atom-economical strategies occur without any prefunctionalization and with very high chemo-, regio- and stereospecificity, and provide linear allylic (*E*) compounds that are interesting as building blocks or bioactive targets (e.g. cinnarizine, an antihistamine obtained by hydroamination of phenylallene).

More recently, we have been interested in the development of a hydrosulfonation method of the same *N*-allenyl derivatives based on the use of sodium sulfonates as nucleophiles and a carboxylic acid as proton donor in stoichiometric amount. During the optimization of the reaction conditions, we finally observed that the hydrosulfonation only requires the presence of the carboxylic acid in stoichiometric amount, and can occur in the absence of the copper catalyst. Thus, we were able to work under simpler and milder conditions (water, room temperature and ambient atmosphere), and this in significantly better yields and in shorter times. After a simple extraction, no further purification is necessary to recover the pure product. Finally, this hydrosulfonation method afforded 23 products in good to high yield, using various (hetero)aryl and (cyclo)alkyl readily available sodium sulfonates. We have thus developed an easy access to allylic sulfones⁶. Further studies are underway to extend this methodology to other (pro)nucleophiles and will be reported in due course.

References

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