conferenceseries.com

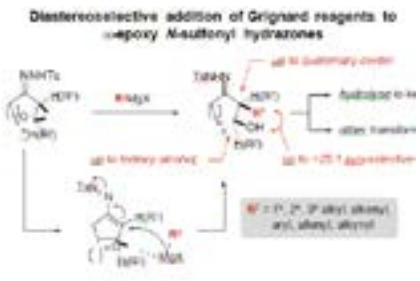
Don M Coltart, Organic Chem Curr Res 2018, Volume:7
DOI: 10.4172/2161-0401-C1-022

4th European
ORGANIC CHEMISTRY CONGRESS
March 01-03, 2018 | London, UK

An umpolung approach to the asymmetric α-alkylation of aldehydes and ketones

Don M Coltart
University of Houston, USA

The α-alkylation of carbonyl compounds and their derivatives (e.g., imines, hydrazones, oximes) via addition of their corresponding (aza)enolates to alkyl halides is a fundamental and highly important synthetic transformation. Notwithstanding this, such transformations are severely limited by the fact that the key carbon–carbon bond forming step proceeds in an S_N2 fashion. Consequently, the incorporation of a substituent whose parent electrophile is not capable of or does not readily undergo an S_N2 reaction (e.g., RX, where R = most secondary alkyl, tertiary alkyl, alkenyl, aryl, allenyl, alkynyl) is not directly feasible using this strategy. The umpolung based alkylation of ketones and aldehydes, in which an organometallic version of the desired substituent adds to an electrophilic α-carbon through the intermediacy of an azoalkene or related species can in principle enable the incorporation of an extremely broad range of carbon based substituents. This is because numerous nucleophilic organometallic species are available spanning the sp^3, sp^2 and sp carbon hybridization states (e.g., RM, where R = primary, secondary, and tertiary alkyl, alkenyl, aryl, allenyl, alkynyl). Not only does such an approach allow for the incorporation of functionality that cannot be introduced using (aza)enolate chemistry, but it is also ideally suited to catalysis and readily adaptable for asymmetric induction. In this presentation, we describe how we have taken advantage of the reactivity of azoalkenes and related species to provide various solutions to the long-standing problem of developing broadly applicable asymmetric approaches to the α–alkylation of carbonyl compounds. Moreover, we demonstrate the versatility of this mode of reactivity in the development of stereo controlled multi-component cascading reactions leading to structurally complex heterocyclic ring systems that are relevant to the synthesis of natural products, drugs, and related compounds



Recent publications

1. Uteuliyev M M, Nguyen T T and Coltart D M (2015) Diastereoselective addition of Grignard reagents to α-epoxy N-sulfonyl hydrazones. Nature Chem. 7:1024–1027.
2. Hatcher J M, Kohler M C and Coltart D M (2011) Catalytic asymmetric addition of thiols to nitrosoalkenes: an umpolung strategy for the synthesis of chiral non-racemic α-sulfenyl ketones. Org. Lett. 13:3810–3813.
3. Hatcher J M and Coltart D M (2010) Copper-(I) catalyzed addition of Grignard reagents to *in situ*-derived n-sulfonyl azoalkenes: an alkylation procedure applicable to the formation of up to three contiguous quaternary centers. J. Am. Chem. Soc. 132:4546–4547.

Biography

Don M Coltart obtained his Master's degree from the University of Manitoba under the supervision of Professor James L Charlton, and he then joined the research group of Professor Derrick L J Clive at the University of Alberta where he obtained his PhD. His Postdoctoral work was conducted at the Memorial Sloan-Kettering Cancer Center as an NSERC, AHFMR and CRI Scholar under the supervision of Professor Samuel J Danishefsky. He began his independent career at Duke University in 2004 and moved to the University of Houston in 2012 where he is an Associate Professor. His research group studies the development of methods for asymmetric carbon–carbon bond formation, the application of those methods to the total synthesis of structurally complex biologically active natural products and the study of those compounds in biological systems.

dcoltart@central.uh.edu