Organic Chemistry
ISSN: 0974-7516

Organic Chemistry: An Indian Journal

Editorial | Vol 15 Iss 10

Cascade Radical Reactions *via* the Formation of Carbon-Carbon/Heteroatom Bonds

Timothy Wilson[*]

Editorial Office, Organic Chemistry: An Indian Journal, UK

[*]**Corresponding author:** Timothy Wilson, Editorial Office, Organic Chemistry: An Indian Journal, UK, E-mail: organicchem@journalres.com

Received: October 04, 2021; **Accepted:** October 18, 2021; **Published:** October 22, 2021

Editorial

To build radical chemistry-based cascade events for forming carbon-carbon and carbon heteroatom bonds. The radical and anionic carbon-carbon bond-forming procedure produced,-disubstituted amino acids *via* the diethylzinc-promoted reaction of dehydroamino acid derivatives with acid anhydride or-allyl palladium complex. Using Bu3SnH and Pd (PPh3)4, this reaction was effectively developed into the reductive transformation of N-phthaloyl dehydroalanine. Using hydroxamate ester functionality as a chiral Lewis acid-coordinating tether between two radical acceptors, the chiral Lewis acid-mediated cascade radical addition-cyclization-trapping reaction went smoothly with good enantioselectivities. This approach was used in a cascade reaction involving the addition of electrophilic perfluoroalkyl radicals to electron-deficient acceptors with adverse polarity mismatch. In addition, a cascade sequence was observed that was terminated by radical-radical coupling. Cascade process strategies have the benefit of forming many carbon-carbon and/or carbon-heteroatom bonds in a single operation. In organic synthesis, radical chemistry has been developed as one of the most powerful strategies for forming carbon-carbon bonds. Because radical intermediates are not charged species, the advantages of using radical methods include high functional group tolerance and gentle reaction conditions. As a result, throughout the previous fifteen years, a number of detailed experiments on sequential radical reactions have been published, with significant progress made in recent years. We've also been interested in developing a new and efficient radical chemistry-based cascade technique for forming carbon-carbon/heteroatom bonds. This summarizes on cascade radical reactions, which are divided into two categories based on the reaction mechanism. Cascade reactions involving both radical and ionic species are less extensively studied than sequential reactions involving only radical species. In the subject of cascade carbon-carbon bond-forming chemistry, the combination of radical and ionic processes is projected to allow for future advancement. Using Et3B as a radical initiator, the radical addition-aldol condensation of enones or enals could be accomplished. Several radical and ionic reactions involving radical and ionic processes were achieved about ten years ago. The conversion of radical species to ionic species is a crucial step in these reactions. Dehydroamino acid derivatives are well-known for their ability to receive radicals. Based on the cascade radical and anionic reaction of dehydroamino acid derivatives, we investigated the synthesis of,-disubstituted amino acids. Using acid anhydride as an electrophile, the reaction of dehydroamino acid derivative 1 was first explored. After hydrolysis of the diphenylimino moiety, dehydroamino acid 1 showed good reactivity, yielding the desired, disubstituted amino acid 2 in 63% yield. The formation of two carbon-carbon bonds and a nitrogenated quaternary carbon-center *via* a cascade radical and ionic process is a noteworthy aspect of this reaction. For the reaction to work, the radical initiator Et2Zn has to be combined with O2. After generating an ethyl radical from Et2Zn and O2, the ethyl radical was added to 1 to produce the intermediate radical A. Et2Zn also served as a good reducing agent in this reaction. As a result, the radical A was quickly transformed into the zinc-enolate anion B and an ethyl radical. When Et3B was used as a radical initiator, however, the reaction failed not proceeds due to Et3B's low reactivity toward the radical to an ester group. In other words, Et2Zn's strong reactivity toward the alkoxycarbonyl-stabilized radical is critical to the transformation's success. Bertrand's group also looked into the production of zinc enolate from a,-unsaturated ester in a diethylzinc-mediated radical reaction. We then examined the combination of radical reaction and transition metal-catalyzed allylation based on the cascade acylation reaction. We

Citation: Wilson T. Cascade Radical Reactions *via* the Formation of Carbon-Carbon/Heteroatom Bonds. Org Chem Ind J. 2021;15(10):41

investigated the Et2Zn-promoted reaction of 1 with allyl palladium complex based on our earlier investigations since the electrophilic -allyl palladium complex has demonstrated excellent reactivity toward soft carbanion. The allylic reagent found to be the most efficient in this transformation was branched acetates. This review summarises our most recent research on cascade radical reactions. The first step is to describe the cascade reaction, which involves both radical and ionic species. The successful coupling of radical reaction with Pd-catalyzed allylation, in particular, is predicted to advance cascade chemistry further. The cascade reaction is then described using the chiral Lewis acid-mediated radical cyclization mechanism. Based on our technique of employing a hydroxamate ester as a coordination site with a chiral Lewis acid, the radical addition-cyclization-trapping process proceeded with good enantioselectivities. In addition, the polarity-mismatched perfluoroalkylation cascade reaction has been devised. These findings open the door to more research into the interesting possibilities of radical reactions in cascade transformations.