

## The title A novel [3+2] cycloaddition reaction of allenoate and isoquinoline

Xueshun Jia, Zhiqiang Liu, Jian Li

Shanghai University, Shanghai, China

Allenoate has received significant interests in organic synthesis due to its facile preparation and versatile reactivity.<sup>1</sup> For instance, the nucleophilic addition and electrophilic addition reactions with a wide range of substances as well as rearrangements have been well documented. In particular, they were proven to be valuable building blocks in many types of cycloaddition reactions.<sup>2</sup> In this field, phosphine-catalyzed cycloaddition reaction is of great interest due to simple reagent and structural diversity of the adduct.

In 2011, we have reported a [2+2+1] cycloaddition involving allenoate by using isocyanide as nucleophile instead of phosphine.<sup>3</sup> In such case, the allenoate and electron-deficient carbonyl-containing isatin in the presence of isocyanide gave a quick access to spirooxindole. As a continuation of our ongoing research, Herein we wish to report that the blending of isoquinoline and allenoate can give a quick access to polycyclic skeletons, which involves an unusual [3+2] cycloaddition.

Notably, flexibility of this method allows the rapid synthesis of polycyclic framework with high efficiency. The mechanistic proposal indicates that proton transfer take place to induce the unusual [3+2] cycloaddition in the presence of nitrogen-containing base. This method is also distinguished by its convenient experimental set-up and excellent atom-economy. As a result, the present protocol has potential to be applied in medicinal and synthetic chemistry.

Reference:

1. For reviews, see: (a) Hashmi, A. S. K. *Angew. Chem., Int. Ed.* **2000**, *39*, 3590-3593. (b) López, F.; Mascareñas, J. L. *Chem. Soc. Rev.* **2014**, *43*, 2904-2915.
2. (a) Danis, J.-B.; Masson, G.; Retailleau, P.; Zhu, J. *Angew. Chem., Int. Ed.* **2011**, *50*, 5356-5360. Clavier, H.; Jeune, K. L.; de Raggi, I.; Tenaglia, A.; Buono, G. *Org. Lett.* **2011**, *13*, 308-311.
3. Li, J.; Liu, Y. J.; Li, C. J.; Jia, X. S. *Chem. Eur. J.* **2011**, *17*, 7409-7413.