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

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Allenoate has received significant interests in organic synthesis due to its facile preparation and versatile reactivity.\(^1\) 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.\(^2\) 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.\(^3\) 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:

