New Strategies For Heterocyclic Carbenes Catalyzed Annulations - A Game-Changer in Organic Chemistry

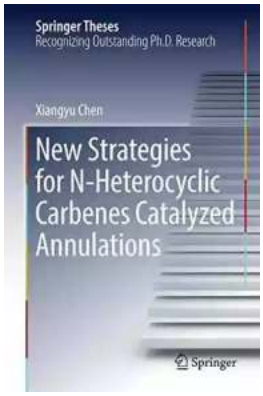
Over the years, the field of organic chemistry has witnessed numerous breakthroughs that have revolutionized the way chemical reactions are conducted. One such game-changer is the use of heterocyclic carbenes (HCs) as catalysts for annulation reactions. These reactions, which involve the formation of cyclic products, have been widely explored and exploited in various synthetic methodologies. However, the of HCs as catalysts has opened up a whole new world of possibilities and has led to the development of novel and highly efficient strategies for these annulations.

The Role of Heterocyclic Carbenes

Heterocyclic carbenes are highly versatile and stable molecules that possess a unique electronic structure. They are typically used as stable intermediates in organic chemistry and have been extensively studied for their reactivity. As catalysts, HCs have emerged as powerful tools due to their ability to activate and stabilize reactive intermediates, facilitate bond-forming processes, and control the stereochemistry of the products. These properties make them ideal for annulation reactions, where the formation of cyclic structures is of utmost importance.

The application of HCs as catalysts in annulations has allowed chemists to access a range of structurally diverse heterocycles, which are vital building blocks in the synthesis of numerous bioactive compounds. These heterocycles include but are not limited to pyridines, pyrimidines, pyrroles, indoles, and quinolines. By employing HCs, chemists can easily construct complex and functionalized

frameworks that were previously difficult to access using traditional methodologies.



New Strategies for N-Heterocyclic Carbenes Catalyzed Annulations (Springer Theses)

by Alessia Elba(1st ed. 2017 Edition, Kindle Edition)

4.8 out of 5

Language	: English
File size	: 5050 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 198 pages

New Strategies Unleashed

One of the most exciting aspects of HCs catalyzed annulations is the development of new strategies that enable the synthesis of complex molecules in a streamlined and efficient manner. Advances in this field have led to the discovery of several novel catalytic pathways, which provide chemists with powerful tools for the rapid construction of diverse heterocycles.

One such strategy is the use of HCs as spectator ligands. Traditionally, HCs were employed as active catalysts, participating in the reaction as both a nucleophile and an electrophile. However, recent studies have shown that HCs can act as spectator ligands, modulating the reactivity of other metal catalysts. This allows for the combination of multiple catalytic cycles, leading to the formation of complex products with high selectivity.

Another important development is the incorporation of HCs in metal-free annulation reactions. In the past, metal catalysts were often indispensable for the success of annulation reactions. However, HCs have shown tremendous potential in driving these reactions forward without the need for transition metals. This not only simplifies the reaction conditions but also opens up new possibilities for sustainable and eco-friendly synthesis.

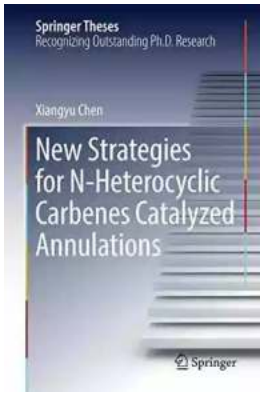
Springer Theses: Recognizing the Impact

The groundbreaking research in the field of HCs catalyzed annulations has been widely recognized and celebrated. One notable platform that honors exceptional research is the Springer Theses. Launched by Springer, a renowned scientific publisher, this series highlights outstanding Ph.D. research across various disciplines.

Several theses focused on the application of HCs as catalysts for annulations have been published in the Springer Theses series. These works not only shed light on the fundamental aspects of these reactions but also showcase the new strategies and transformations that have emerged. The impact of these theses in advancing the field of organic chemistry cannot be overstated, as they provide valuable insights and practical methodologies for chemists worldwide.

The utilization of heterocyclic carbenes as catalysts for annulations has undeniably transformed the field of organic chemistry. With their exceptional reactivity and ability to control the synthesis of diverse heterocycles, HCs have become a game-changer in this domain. The development of new strategies and methodologies, as well as the recognition of outstanding research through platforms like Springer Theses, further cement the significance of HCs catalyzed annulations in advancing the frontiers of organic chemistry. As researchers

continue to explore and innovate in this area, we can expect even more exciting discoveries and applications in the future.



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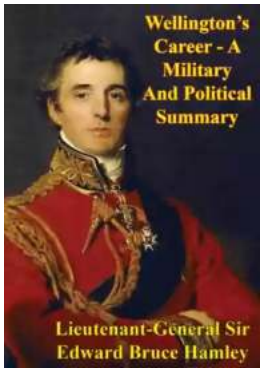
This thesis focuses on NHC-catalyzed annulation of nitroalkenes, enals and α,β-unsaturated carboxylic acids. (1) NHCs were found to be efficient catalysts for the [4+2] annulation of β-substituted nitroalkenes. The scope of Rauhut–Currier reaction was successfully extended to the most challenging β-substituted alkenes by this method; (2) Enals were successfully used for [4+2] annulations with azodicarboxylates catalyzed by NHC via γ-addition. Highly enantiopure tetrahydropyridazinones and γ-amino acid derivatives could be easily prepared by subsequent transformations of the resulting dihydropyridazinones. (4) The readily available α,β-unsaturated carboxylic acids were first successfully employed to generate the α,β-unsaturated acyl azolium intermediates by using NHC for the enantioselective [3+2] and [3+3] annulations.



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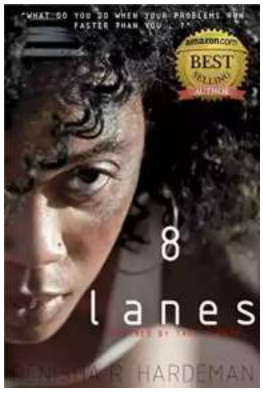

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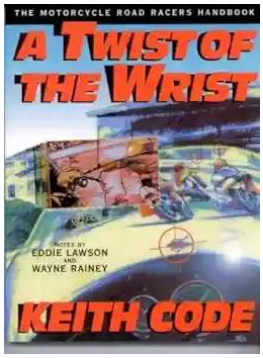

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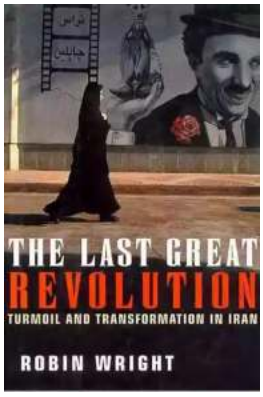

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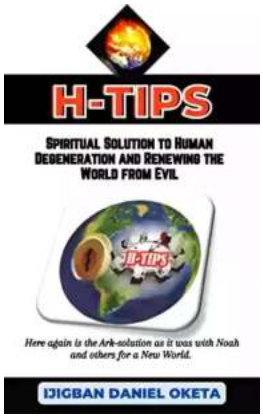

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