

Methanofullerenes from Cycloaddition to C₆₀ an Editorial

Jeff Hardy*

Editorial office, Trade Science Inc., UK

*Corresponding author: Jeff Hardy, Editorial office, Trade Science Inc., UK, E-mail: hardyi_j@hotmail.com

Received: February 01, 2021; Accepted: February 15, 2021; Published: February 23, 2021

Editorial

The [2+1] cycloaddition process is the most common form of fullerene core functionalization. The reactions that result in methanofullerenes are the most promising of these. They're made in two ways: the Bingel process of nucleophilic cyclopropanation and the thermal addition of diazo compounds. The key cyclopropanating agents used in the synthesis of monosubstituted methanofullerenes, as well as the optimal conditions and mechanism of the [2+1] cycloaddition, as well as the functional application of the target products, are discussed.

Scientists are currently concentrating on high selectivity and yield methods for functionalizing the fullerene core. Radical inclusion, nucleophilic addition, and cycloaddition are all quickly achieved with the electron-deficient polyene C₆₀. The decrease in strain in the fullerene core should be considered the reactivity's driving force in this case. The [2+n] cycloaddition reactions, with n ranging from 1-4, are the most promising in terms of fullerene sphere functionalization. The [2+1] cycloaddition is the most popular among synthetic organic chemists because it produces methanofullerenes, fullerenoaziridines, and fullerenoxyranes.

The addition of stabilised carbanions, carbenes, and nitrenes, for example, can be used in these reactions, which can require a variety of reaction mechanisms. Although the quest for various addends for various cycloaddition variants, as well as the determination of the key regularities of these processes, were of primary interest in the early years of intensive research on reactions of cycloaddition to C₆₀, the patterns of studies have recently changed.

They are now concentrating on the targeted synthesis of fullerene derivatives with unique properties, the creation of fundamentally new cycloaddition reagents, and extensive studies of multiaddition processes and polycyclic adduct characteristics. The majority of researchers working on C₆₀ functionalization methods prefer [2+1] cycloaddition reactions, with methanofullerenes being one of the most common. The Bingel reaction and the addition of diazo compounds at elevated temperatures with subsequent release of N₂ are the two key synthetic methods for the synthesis of methanofullerenes.

The Bingel reaction, which involves cyclopropanation of C₆₀ with stabilised halocarbanions, is the most effective way to make methanofullerenes. It's almost adaptable; in the presence of a reactive methylene feature in halo-substituted substrates and base facilitation, methanofullerenes with a variety of structures are formed fairly easily. Nucleophilic addition of a halocarbanion to C₆₀ is thought to occur first, followed by intramolecular replacement of the halogen atom by an anionic centre (which is generated on the fullerene sphere). When C₆₀ is treated with 2-bromomalonate in the presence of a base in the first variant, cyclopropanation occurs; the reaction is completed rapidly, and yields are generally strong. However, this method requires an extra step, in which the cyclopropanating agent must first be halogenated. The result is usually a difficult-to-separate mixture of mono and dihalo-containing materials.