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ИНФОРМАЦИОННЫЕ УСЛУГИ

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Benzoannulation of aromatic heterocycles: advances in the 21st century

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Benzoannulated aromatic heterocycles (BAHs), also known as benzoheterocycles, are key building blocks in the development of functional materials and pharmaceuticals. They are involved in a variety of biochemical processes in nature. The prevalence and widespread use of these molecules stimulates the chemical community's ongoing interest in developing methods to construct carbazole, indole, quinoline, isoquinoline and benzo[b]thiophene motifs. The most common strategy for preparing them is the heteroannulation of functionalized benzene derivatives. Over the last two decades, an alternative approach based on the annulation of heterocyclic derivatives has been developed: benzoannulation, also known as benzannulation. Compared to classical heteroannulation, this approach has several advantages and has led to significant progress in the availability of a variety of benzoheterocycles in recent years. This review is the first to analyze the development of benzoannulation methods for aromatic heterocycles in the 21st century. We highlight the advantages of the benzoannulation strategy, including the versatility of the methods, the availability of starting compounds and the ability to obtain products with specified substituents in the benzene ring. This review aims to help chemists with the synthesis of benzoheterocycles of a specific structure for various applications, ranging from the design of biologically active compounds and the synthesis of natural products to materials chemistry.

Bibliography — 298 references.

Synthesis and photophysical properties of isocoumarins

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Isocoumarins are isomers of a widely known class of aromatic organic lactones, coumarins, which possess unique photophysical properties. Despite the structural similarity of coumarins and isocoumarins, applications of the latter have long been limited to medicine and agriculture, in view of their fungicidal, antibacterial, and anti-inflammatory activities. Most organic compounds of this class have been isolated from living organisms. The effective method for the synthesis of isocoumarins discovered in the beginning of the 21st century, which is based on C–H coupling of benzoic acids with acetylenes, made these compounds easily accessible. This gave impetus for their wide use in the design of materials for organic photonics and optoelectronics. The present review focuses on the photophysical properties of isocoumarins in comparison with coumarins and covers known methods for the design of the isocoumarin core published before March, 2025.

Bibliography — 249 references.

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Catalytic C–N bond formation reactions play a crucial role in fine organic synthesis, as they are used to prepare biologically active compounds and natural products. The recent advances in the modern theory of catalytic processes, particularly development of the concept of dynamic catalysis, necessitate a re-evaluation and systematization of the vast experimental data accumulated in this field. This review provides analysis of C–N bond formation reactions from the perspective of contemporary catalytic concepts. Considerable attention is paid to catalyst transformations resulting in the formation of ‘cocktail’-type systems and ways to control these processes. Understanding of these mechanisms is essential for the design of efficient catalytic systems applicable to cross-coupling reactions and other key synthetic reactions.

Bibliography — 132 references.

