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NUCLEOPHILIC C-H FUNCTIONALIZATION OF ARENES: A NEW SYNTHETIC TOOL FOR GREEN CHEMISTRY

Valery N Charushin[1,2] and Oleg N Chupakhin[1,2]

[1]Postovsky Institute of Organic Synthesis-Ural Branch of RAS, Russia
[2]Ural Federal University, Russia

Direct metal-free C-H functionalization of aromatic and heteroaromatic compounds is a new chapter in organic chemistry. The results of comprehensive studies on nucleophilic substitution of hydrogen in arenes and hetarenes (the SNH reactions), including their mechanisms, intermediates, mathematic and electrochemical modeling, kinetics, electron-transfer, etc. will be presented and discussed. The SNH methodology is of great practical value, since it involves nucleophilic alkylation, alkenylation, alkynylation, arylation, amination, hydroxylation, alkoxylation, cyanation, cyanomethylation, halogenation, as well as cymantrenylation, carboranylation, ferrocenylation and other reactions. The SNH reactions change the logic of organic synthesis, providing a powerful synthetic tool to functionalize C-H chemical bonds in a variety of nitro- and azaaromatic compounds, quinones, azinones, porphyrins, azulenes and arene-metal-complexes. Also they can be carried out in the electrochemical mode, which opens new opportunities to avoid preliminary incorporation of good leaving groups or other functionalities in an aromatic ring, thus being in a good agreement with principles of green chemistry.

valery-charushin-562@yandex.ru