SUMMARY

The quest for sustainable and economically feasible methods for the synthesis and functionalization of organic compounds has become a prominent focus in the field of synthetic organic chemistry. In the pursuit of eco-friendly techniques, chemists have persistently sought to replace toxic metal-based reagents and harsh reaction conditions with mild, metal-free alternatives. As a result, the main aim of this thesis is to introduce gentle and sustainable protocols for the creation of C-X (-N, -C, -O, -Br) bonds, which are intended for the synthesis and functionalization of heterocycles through C-H functionalization methods. In this regard, we have developed approaches utilizing $CsPbBr_3$ Perovskites as catalysts for C-X (-N, -C, -O, -Br) bond formation reactions. Additionally, we have established a three-component multicomponent reaction of quinoxalin-2(1*H*)-ones under visible light conditions, employing Mes-Acr-$MeClO_4$ as a photocatalyst. Furthermore, a thermocontrolled strategy was investigated for the functionalization of quinoxalin-2(1*H*)-ones at the C_3 versus C_7 positions.