

Microwave-assisted rapid and green synthesis of cyclic carbonate from CO₂ exploiting the superlative hydrogen-bonding capability of formic acid/KI catalytic system with epoxide

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In recent years, researchers have used microwaves as a new protocol with the perspective of reducing reaction time, avoid side products, increase product yield, and simplify the course of reactions for combinatorial chemistry. The development of an environmentally benign approach for the chemical fixation of CO₂, one of the detrimental greenhouse gases, has been of particular interest to the chemical industry. Here, we employed an environment-friendly methodology for the cycloaddition of CO₂ to an epoxide under microwave irradiation, with HCOOH/KI as the catalyst system. Various epoxide substrates were subjected to the microwave irradiated cycloaddition using HCOOH/KI catalyst. The effects of reaction parameters like catalyst composition, microwave power, CO₂ pressure, and reaction time have been investigated. The synergistic influence of the COOH/KI catalyst in the reaction has been compared with that of OH/KI system and was theoretically simulated using density functional theory.