

Cu-Zr binary metal organic frameworks: a heterogeneous catalyst for the chemical fixation of CO<sub>2</sub> via cyclic carbonate synthesis

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Increasing concerns over global warming have prompted researchers to develop strategies that could minimize the emission of carbon dioxide from industries and power plants as a byproduct. Efficient strategies for the reduction of greenhouse gas emissions, primarily CO<sub>2</sub>, are needed. MOFs are a new and emerging class of porous material that have been dynamically investigated as catalysts for the synthesis of cyclic carbonates owing to its greater CO<sub>2</sub> affinity. In this study, binary metal organic frameworks (MOFs) with HKUST-1 and UiO-66 have been synthesized using solvothermal method. The synthesized binary MOF is investigated for its catalytic efficacy in the synthesis of cyclic carbonates from epoxides and CO<sub>2</sub>. The UiO-66/Cu-BTC binary MOF provides high conversion rates of epoxides to cyclic carbonates with >99% selectivity under solvent-free conditions. The effects of reaction parameters such as catalyst amount, reaction time, CO<sub>2</sub> pressure and reaction temperature were also studied in detail. Finally, a plausible reaction mechanism for binary MOF-catalyzed epoxide-CO<sub>2</sub> cycloaddition reaction is also proposed. Keywords: Binary MOF, CO<sub>2</sub> utilization, epoxide, cyclic carbonates.