Quaternized Mil-53-Nh_2 As Efficient Catalyst For Cyclic Carbonate Synthesis From Epoxides And Co_2

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The increasing concern over global warming necessitates the sequestration of CO_2 released from power plants and industries. Thus, the transformation of CO_2 to useful chemicals such as dimethyl carbonate, N,N'-disubstituted ureas, cyclic carbonates, cyclic urethanes, formic acid, etc are highly demanded. Five-membered cyclic carbonates, catalytically synthesized by the cycloaddition of CO_2 with epoxides, are used as solvents, electrolytes batteries, intermediates in chemical, pharmaceutical and polymer synthesis. Herein we report quaternization as an efficient PSM technique for tuning amine functionalized MIL-53 for an efficient, solvent-free synthesis of cyclic carbonates from epoxide and CO_2. A series of quaternized amine-functionalized MIL-53 with various alkyl chain lengths and halides (X=Cl, Br, I) were synthesized, characterized using various physicochemical techniques and studied the influence of alkyl chain length and halides in exhibiting the catalytic activity for cycloaddition. MIL-53-NMe_3I which gave the highest conversion was synthesized using microwave energy, thereby reducing the time for catalyst synthesis while maintaining more or less of the activity.