

Quaternized Polystyrene-Supported Amino Acids as Efficient Catalyst for the Cycloaddition of Epoxides with CO₂

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The chemical transformation of CO₂ to useful products is undergoing extensive research not only to overcome its threat as a global warming agent, but also owing to its attractiveness as a cheap, abundant, non-toxic and inflammable C1 feedstock. In this study, various amino acids were covalently grafted onto DVB cross-linked polystyrene resin and then functionalized with alkyl halides of different alkyl chain length and anions. To investigate the performance of the catalysts, they were used as heterogeneous catalysts for the synthesis of cyclic carbonate via cycloaddition reaction of epoxide and CO₂. The catalysts were characterized by EA, XPS, ¹³C NMR, FT-IR, and EDS/SEM. The catalysts showed good catalytic activity for the synthesis of the cyclic carbonate from the epoxides and carbon dioxide. The effects of the alkyl halide structure and reaction parameters such as temperature, reaction time, CO₂ pressure and catalyst amount on the reactivity of the catalysts were also studied. The catalyst could be reused up to four successive runs without a significant reduction in the initial activity.