

Alkanolamine CO₂ scrubbers as catalysts for CO₂-epoxide cycloaddition

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Alkanolamines are simple molecules widely familiar as CO₂ scrubbers for its CO₂ absorption capacity and hence produced in colossal amounts worldwide. In this work, the applicability of these molecules as catalysts as well, for cyclic carbonate synthesis by the cycloaddition of carbon dioxide and epoxides is reported. Eventhough, cyclic carbonate synthesis is an established reaction, the catalysts employed have always contained metals and/or halide anions. Only very recently, the first report of a metal-halide free catalyst for cyclic carbonate synthesis from CO₂-epoxide coupling was made using cellulose/superbase as an environmentally benign catalyst which advocated that, the synergistic role play by hydrogen bonding groups and amine moieties could viably substitute metallic centres and halide anions. Alkanolamines are also metal and halide free molecules and as shown in this work, they materializes a promising yield of cyclic carbonates from a series of terminal epoxides under mild reaction conditions and in addition, density functional studies were performed in an attempt to understand the mechanistic pathway.