

Synthesis of cyclic carbonate from allyl glycidyl ether and CO₂ using polyethylene glycol-immobilized ionic liquid

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CO₂, which is considered as a major green house gas, has received much attention in industry. Because CO₂ is recognized to be a naturally abundant, cheap, recyclable and non-toxic carbon source that can sometimes replace toxic chemicals. The cycloaddition of CO₂ to epoxide is one of the industrial processes that utilize CO₂. Cyclic carbonate has several applications as electrolyte components in lithium batteries, aprotic polar solvents, chemical intermediates and monomers in the production of pharmaceutical and fine chemicals. Polyethylene glycol immobilized ionic liquids (PEG-ILs) were developed and evaluated in the cycloaddition of CO₂ to allyl glycidyl ether (AGE) to form 5-membered cyclic carbonate. 1-(2-hydroxyethyl)-3-methylimidazolium chloride ionic liquid was immobilized on polymer PEG by esterification. PEG-IL was proved to be efficient heterogeneous catalyst which requires no additional organic solvents either for the reaction or for the separation of product. The reaction was carried out in a batch autoclave reactor and the effects of CO₂ pressure, reaction temperature and time on the cycloaddition of CO₂ to AGE were studied.