

# Green carbonylation approach to isocyanate and polyurethane

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**D**uring the last several years, non-phosgene syntheses of isocyanates and diisocyanates have been studied based on primary amines and diphenyl carbonate (DPC). The carbonylation of aliphatic amines into aliphatic carbamate intermediates are straight forward, but carbonylation of aromatic amines needs catalyst systems for activation. However, both carbamates were synthesized in >95% under ambient temperatures. Pyrolysis of carbamates gives isocyanate at temperatures of greater than 180°C with more complications occurred in aliphatic than those

in aromatic cases. Conditions, mechanism and complications encountered in the process will be discussed. Similar green chemistries and synthetic strategies have been applied to the carbonylation of aliphatic amine using polycarbonate (PC). The details of degrading carbonylation and its application to PC recycling into isocyanates, cyclic carbamates and polyurethanes will be presented.

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