PU depolymerization with Phosgene-free recovery of diisocyanate

J.-P. Lange

University of Twente, Enschede, The Netherlands. Email: J.p.lange@utwente.nl

Polyurethanes foams are not be readily recycled mechanically or chemically after use: as thermoset they can't be remelted for mechanical recycling, their depolymerization requires the use of toxic phosgene to recover one of their key constituent, the diisocyanate.

We report here a novel depolymerization method that allows recovery of both polyol and diisocyanate without needing phosgene. We depolymerize PU with a carbonate that function as solvent and depolymerization reagent to recover its polyol constituent with carbonate end-group and its diisocyanate constituent in the form of dicarbamate. The intermediates can be separated from one another and recycled to the desired polyol and diisocyanate by alcoholysis and thermolysis, respectively.

Reference: E. Hosgor, R.P. Martinho, J.S. Hoogland, Y. Jia, A. Morales Gomez, W. Verboom, J.-P. Lange, J. Huskens; under review (2025)