

# Study of the carbamate-aldehyde-reaction: toward new thermosetting resins

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The vast majority of the crosslinking systems currently involved in the synthesis of thermosetting resins require the use of hazardous components for the environment as well as for the operators. Polyurethanes, which are among the most important polymer materials thanks to their versatile properties, are not an exception to this issue. Polyurethanes are indeed classically obtained by polyaddition between a polyol and a polyisocyanate, the synthesis of the latter involving the use of highly toxic phosgene derivatives. The development of safer and more eco-friendly alternatives to those already existing crosslinking systems are thus of particular interest for both academic and industrial research teams [1-2].

The aim of this project is to explore a new alternative for the synthesis of crosslinked polyurethanes via the reaction between primary carbamate and aldehyde functions. Although being known since the 19th century [3], this reaction hasn't been used to make crosslinked polymers until very recently.

However, it possesses advantages that make it suitable and interesting to obtain thermosetting resins, such as versatility and possibility to cure at ambient temperature. This work starts with the comprehensive study of the carbamate / aldehyde reaction through model reactions in order to validate the feasibility of this new route, and ultimately aims for the elaboration and characterization of the novel thermosetting resins obtained therefrom.

[1] J. N. Argyropoulos, D. Bhattacharjee, P. Foley et al. *US20110313091 A1*, (22-déc-2011)

[2] L. Maisonneuve, O. Lamarzelle, E. Rix et al. *Chem. Rev.*, 115, 22, 12407 (2015)

[3] D. Roth, *Justus Liebigs Ann. Chem.* 152, 72 (1870)