Development of reactive polyurethane resins for use as hotmelt in the wood industry

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Abstract

HotPUR project is promoted by Lorcol, in cooperation with Faculdade de Engenharia da Universidade do Porto, Instituto Politécnico de Viseu and Associação Rede de Competência e Polímeros, as R&D partners, and Vicaima as the final user of the product to be developed. The project's main objective is to provide Lorcol with a new line of products: reactive polyurethane hot-melt adhesives, PU-HMR. This will allow Lorcol to fill a gap in its product portfolio. The company will be able to offer a complete range of adhesives for the wood industry.

Reactive polyurethanes hot melt adhesives (PU-HMR) are prepolymers prepared from polyester and or polyether glycols and diisocyanates. The urethane linkage (-NH-COO-) in the polyurethane is a result of the reaction between the diisocyanate (-NCO) groups and polyol hydroxyl groups (-OH). They formed block copolymers composed of alternating soft and hard blocks or segment. The soft segment provides elastomeric character to the polymer while the hard segment forms dimensional stability. PU-HMR are moisture-curing polyurethane adhesives applied typically between 85 °C and 140 °C in the form of a melt and solidifying at room temperature. The final curing is attained at 24 to 48 hr. The initial bond strength of PU-HMR is activated by the solidification and the final strength is achieved with the reaction of free NCO with both wood and moisture.
Polyurethane prepolymers were synthesized by reacting molar excess of diphenyl methane diisocyanate (MDI) with different polyols and filler. Different formulations were performed in order to evaluate the influence of the most important parameters on bonding performance and though their ability for edge banding in doors. Chemical characterization and the structure properties of the PU-HMR was also performed and study between the different polyurethane synthesis, by fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis, differential scanning calorimetry and size exclusion chromatography. Amorphous and crystalline polyols and isocyanates with different molecular weights and reactivity, were test-

ed. To study the glue characteristics as the final viscosity, open time, wood bonding and thermal properties, the initial ratio NCO/OH and final NCO were changed.

Keywords—Adhesives, isocyanate, hot melt adhesive, Polyurethane

Professional Biography (100-150 words)

Cláudia Esteves has completed her Master Degree in Chemical Engineer at the age of 24 years from Coimbra University. She is a researcher in Lorcol.

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Any Comments: