



Investigation of the effect of introducing siloxane groups into the polymer chain on selected properties of polyurethane materials

A. Puszka^{a,*} K. Mikon,^a J. Sikora^b

^a *Department of Polymer Chemistry, Faculty of Chemistry, Institute of Chemical Sciences, Maria Curie-Skłodowska University in Lublin, Lublin, Poland*

^b *Department of Technology and Polymer Processing, Faculty of Mechanical Engineering, Lublin University of Technology, Lublin, Poland*

* *andrzej.puszka@mail.umcs.pl*

The aim of this work was the synthesis and characterization of new poly(thiourethane-urethanes) containing siloxane groups in their structure. The aliphatic diisocyanate, i.e. 4,4'-dicyclohexylmethane diisocyanate (HMDI), was used as raw materials, the soft segment was poly(ϵ -caprolactone) diol (PCL), while the chain extender was (methanediyl-dibenzene-1,4-diyl)dimethanethiol (DMT), synthesized at the Department of Polymer Chemistry of UMCS. Poly(dimethylsiloxane) (PDMS, Carbinol DMS-C16) was used as a modifier. Using the above substrates and the method of catalyzed polyaddition in the melt, a series of PURs with 50 wt% of hard segments were obtained, in which 1, 2, 5, 10, 15 and 20 wt% of PCL was replaced by PDMS.

For the synthesized PURs, the structure (by Fourier transform infrared spectroscopy) and some physicochemical properties (reduced viscosity, chemical resistance, density, contact angle values), thermal properties (by thermogravimetric analysis (TG) and differential scanning calorimetry (DSC)), thermomechanical properties (DMA method) as well as Shore A/D hardness and mechanical properties were examined.

Keywords: polyurethane, siloxane groups, mechanical properties, thermal properties, physico-chemical properties

Funding: This study was supported by the National Science Centre of the Republic of Poland (NCN) Grant number: 2022/06/X/ST4/00452

Acknowledgments: The Authors would like to thank you for the opportunity to collaborate within the framework: Internship across the border (Union of Lublin Universities, ZUL).