

Rheological Measurement of Polymeric Composites before and after UV Degradation

Lenka Markovičová, Viera Zatkáliková, Milan Uhříčik, Tatiana Liptáková

Faculty of Engineering, Department of Materials Engineering, University of Zilina, Univerzitna 8215/1, 010 26 Zilina, Slovakia, e-mail: lenka.markovicova@fstroj.uniza.sk

The aim of this paper is the comparison of selected rheological properties of polymeric composites with glass fibers materials before and after exposure in UV box. Rate and depth of degradation induced by the environment were evaluated by Frequency Sweep Test, which monitors changes in viscoelastic properties of polymers with respect to their molecular structure and their behavior in thermoplastic processes. Degradation process resulted in changes of complex dynamic viscosity, storage and loss modulus, changes in molecular weight and its distribution. UV radiation is intense degradation factors affecting the change in the structure and properties of polymers - the polymer matrix gradually degrades by UV radiation, the viscosity of the composites decreases, the COP is moved to lower angular frequencies with increasing molar mass.

Keywords: polyamide, frequency sweep test, UV degradation, microstructure, glass fibers

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The properties of the polymer before and after weathering and UV radiation were also compared. Degradability was examined by measuring color change, FTIR spectrum analysis and determination of the ageing factor k. The tensile strength, elongation at break and hardness of composites by Shore A method were measured. Understanding the degradation processes of polymer matrix under the influence of various external factors and predicting the lifetime of polymeric materials is very important for better design of processes, manufacturing and for industry. This study was supported by the National Centre for Research and Development (NCBR) project: LIDER/32/0139/L-7/15/NCBR/2016. Structure-rheology relationship, the key to product development and process control. It is well known that materials of the same grade, but from different batches, may process quite differently. Depending on the die geometry, on-line rheometers can provide a real time measurement of MFR or shear viscosity as a function of rate. Equipped with an optical window to do NIR, UV etc. measurements the on-line rheometer can measure also additive levels, degradation, color, etc. In order to develop materials with the correct processing behavior, it is not just sufficient to take into account the viscosity. Microbial deterioration and degradation of polymeric materials. S Krishna Mohan*, Tanu Srivastava. Received: 27 October 2010 / Received in revised form: 14 December 2010, Accepted: 24 February 2011, Published online: 2 March 2011, © Sevas Educational Society 2008-2011. Nomenclature FRPCM – Fiber reinforced polymeric composites T_m – Melting point temperature T_g – Glass transition temperature EPS – Extracellular polymer substances References Albinas L, Loreta L & Dalia P (2003) Micromycetes as deterioration agents of polymeric materials. International Biodeterioration & Biodegradation 52:233-242 Alexander M (1977) Introduction to Soil Microbiology, 2nd Edition.