Accepted Manuscript

Thermoplastic polyurethanes with glycolysate intermediates from polyurethane waste recycling

Tamara Calvo-Correas, Lorena Ugarte, Patrycja Jutrzenka Trzebiatowska, Rafael Sanzberro, Janusz Datta, M. Ángeles Corcuera, Arantxa Eceiza

PII: S0141-3910(17)30278-1

DOI: 10.1016/j.polymdegradstab.2017.09.001

Reference: PDST 8346

To appear in: Polymer Degradation and Stability

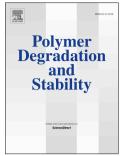
Received Date: 18 July 2017

Revised Date: 30 August 2017

Accepted Date: 1 September 2017

Please cite this article as: Calvo-Correas T, Ugarte L, Trzebiatowska PJ, Sanzberro R, Datta J, Corcuera MÁ, Eceiza A, Thermoplastic polyurethanes with glycolysate intermediates from polyurethane waste recycling, *Polymer Degradation and Stability* (2017), doi: 10.1016/j.polymdegradstab.2017.09.001.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



1 Thermoplastic polyurethanes with glycolysate intermediates from polyurethane waste 2 recycling Tamara Calvo-Correas¹, Lorena Ugarte¹, Patrycja Jutrzenka Trzebiatowska², Rafael 3 Sanzberro¹, Janusz Datta², M. Ángeles Corcuera¹, Arantxa Eceiza¹* 4 5 ¹ 'Materials + Technologies' Research Group (GMT), Department of Chemical and 6 Environmental Engineering, Polytechnic School, University of the Basque Country, Pza Europa 1. Donostia-San Sebastian, 20018, Spain 7 8 ² Gdańsk University of Technology, Faculty of Chemistry, Department of Polymer Technology, 9 G. Narutowicza Str. 11/12, 80-233 Gdańsk, Poland 10 11 *corresponding author: arantxa.eceiza@ehu.eus, janusz.datta@pg.gda.pl 12 ABSTRACT The polyol is a major component in polyurethane formulations and therefore introducing to the 13 14 formulation recycled polyol (obtained during decomposition process) allows decreasing the 15 usage of pure petrochemical components. In this work, thermoplastic polyurethanes were prepared using various mixtures of a petrochemical macrodiol (poly(ethylene-butylene 16 adipate)diol (PEBA) and a recycled glycolysate intermediate, called glycolysate polyol, in a two-17 18 step synthesis procedure with 4,4-diphenylmethane diisocyanate (MDI) and 1,4-butanediol 19 (BD). The glycolysate polyol was obtained during glycolysis process of polyurethane elastomer 20 using ethylene glycol as a decomposing agent. Glycolysate polyol showed a higher hydroxyl value (199 mg KOH g⁻¹) and glass transition temperature (Tg, -50.1 °C) than pure macrodiol 21 (PEBA). The maximum concentration of glycolysate polyol was 25 wt% over the total polyol. 22 23 Synthesized polyurethanes had similar chemical structure compared to the polyurethane

synthesized without glycolysate polyol, confirmed by Fourier transform infrared spectroscopy. On the one hand, higher contents of glycolysate polyol resulted in higher T_g and a slightly lower thermal stability analyzed by thermogravimetric analysis. On the other hand, improved thermomechanical and mechanical properties were obtained in polyurethanes with partial replacement of pure macrodiol.

29

30 Keywords: chemical recycling, glycolysis, glycolysate polyol, thermoplastic polyurethanes

Download English Version:

https://daneshyari.com/en/article/5200766

Download Persian Version:

https://daneshyari.com/article/5200766

Daneshyari.com