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## Development of more sustainable viscoelastic polyurethane foam

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**Statement of the Problem:** Viscoelastic polyurethane foams are materials widely used in industry due to their specific properties. These materials offer unique properties in terms of comfort and provide great value to bedding products. Nowadays, with the growing concern for protection of environment and limitation of fossil products, there is a need to develop more sustainable alternatives. In this way, new raw materials of renewable origin are actually being developed with the aim of avoiding or decreasing the petroleum derivatives dependence. Obtaining of viscoelastic foams with a high percentage of eco-sustainable materials, without losing their performance, is a challenge nowadays. The objective of this work is to analyse the effect related with the replacement of synthetic polyol for a renewable polyol (biopolyol) on the foaming reaction experimental variables and final properties of viscoelastic foams.

**Methodology and theoretical orientation:** From a conventional formulation for viscoelastic foam, different percentages of polyol were replaced by Emerox 14050, a commercial biopolyol with 80% of bio-content. The characterization of raw materials was carried out and chemical reactions were controlled to establish the effect of the polyol replacement on kinetic experimental parameters. The foams were subjected to a complete characterization, analysing the differences in final properties of foamed materials for each biopolyol concentration added in the formulation.

**Findings:** The use of biopolyol affects foam mixture processability. The FTIR, TGA and DSC analysis indicate changes in chemical structure and thermal properties of foams as the concentration of biopolyol is increased. Physical and mechanical properties of foams can be adjusted by making changes in formulation.

**Conclusion and meaning:** Up to 50% of polyol of petrochemical origin has been replaced by a product of sustainable origin in viscoelastic polyurethane foams which maintains its viscoelastic properties and possesses appropriate properties for their use in bedding products.

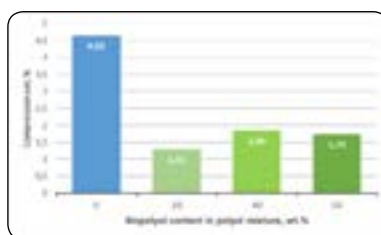


Figure 1. Compression set of viscoelastic polyurethane foams with different contents of biopolyol.

### Recent Publications:

1. Ain NH, Maznee TTN, Norhayati MN, Noor MAM, Adnan S, Devi KPP; Mohd NS, Yeong SK, Haximah AH, Campara I, Sendijarevic V, Sendijarevic I (2016) Natural palm olein polyol as a replacement for polyether polyols in viscoelastic polyurethane foam. *Journal of the American Oil Chemists' Society* 93:983-993.
2. Ain NH, Maznee TTN, Noor MAM, Srihanum A, Devi KPP; Mohd NS, Mohdnoor N, Kian YS, Hassan HA, Campara I, Schiffman CM, Pietrzyk K, Sendijarevic V, Sendijarevic I (2016) Structure-property performance of natural palm olein polyol in the viscoelastic polyurethane foam. *Journal of Cellular Plastics* 53.
3. Gama NV, Soares B, Freire CSR, Silva R, Neto CP, Barros-Timmons A, Ferrerira, A (2015) Bio-based polyurethane foams toward applications beyond thermal insulation. *Materials and Design* 76:77-85.
4. Kattiyaboot T, Thongpin C (2016) Effect of natural oil based polyols on the properties of flexible polyurethane foams blown by distilled water. *Energy Procedia* 89, 177-185.

5. Prociak A, Malewska E, Kuranska M, Bak S, Budny P (2018) Flexible polyurethane foams synthesized with palm oil-based bio-polyols obtained with the use of different oxirane ring opener. *Industrial Crops and Products* 115, 69-77.

## Biography

Marta Muñoz Martí works in Materials, Adhesion and Polymers Area in CETEM (Technological Center of Furniture and Wood). After studying at University of Murcia and Polytechnic University of Valencia, she got a Biotechnology bachelor degree. She developed a project at Microbiology Department of School of Agricultural Engineering and Environment at Polytechnic University of Valencia, developing a PCR detection method for bacteria used in bioremediation. After three years working in a food company laboratory at Valencia, he joined the R&D department of Technological Center of Furniture and Wood of the Region of Murcia, a technology center dedicated to carry out innovative activities with the aim of encouraging the development and continuous improvement of wood and furniture companies.

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