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Synthesis of bio-based polyurethanes with simultaneous formation of composites reinforced by coconut and sisal fiber mats

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The present study aims to contribute to replacing fossil sources with renewable ones in forming polymer matrix composites. Bio-based polyurethanes were synthesized, in the absence of solvents and catalysts, using as polyols ricinoleic acid triglyceride (the main component of castor oil) and lignosulfonate (obtained from wood) in addition to an aliphatic source of isocyanate groups. Mats composed of sisal or coconut lignocellulosic fibers were used as reinforcement. Mats and reagents were inserted into molds and the synthesis and formation of composites co-occurred under heating and compression. For comparison purposes, an unreinforced polymer was obtained under conditions similar to those of the composites. The results indicate that the syntheses were completed successfully, as demonstrated by the materials formed and the excellent thermal stability of the neat bio-based polyurethane and composites, as shown by thermogravimetric analysis. The study is ongoing, with the perspective that materials with good resistance to impact and flexion were formed, meeting the expectations of creating sustainable and environmentally sound materials.