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Author	:	Nor Najiha Adnan, Mohd Hafidzal Mohd Hanafi, Nurul Hanim Razak, Fahmi Asyadi Md Yusof, Syazwan Hanani Meriam Suhaimy, Grasianto
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Abstract	:	This study investigates the mechanical and thermal properties of plasticizers formulated with Epoxidized Waste Cooking Oil (EWCO). The primary objective is to evaluate the influence of EWCO as a plasticizer on the performance of polylactic acid (PLA) composites. Epoxidation of waste cooking oil with and without catalyst (sulfuric acid) is applied before mix with PLA. PLA, a biodegradable polymer, is chosen due to its environmental benefits, but its brittleness limits its application. By incorporating varying weight ratios of EWCO (2.5%, 5%, 7.5%, and 10%), both with and without the presence of a catalyst, the tensile strength and thermal stability of the resulting composites are assessed. The mechanical properties were analyzed through tensile strength tests, revealing that the inclusion of EWCO generally decreases the tensile strength of PLA. Notably, the addition of a catalyst significantly enhances the tensile strength, demonstrating the potential of catalysts in optimizing the mechanical properties of PLA/EWCO composites. Thermal properties were evaluated a melting point and a glass transition temperature (Tg). Results indicate that EWCO influences the thermal stability of PLA, with variations depending on the presence of a catalyst and the EWCO concentration. The results in this research also shows that sulfuric acid is used as a catalyst in the epoxidation process of waste cooking oil (WCO) to produce epoxidized waste cooking oil (EWCO) the epoxide yield achieve around 85% and give shorter reaction time of 4 hours. This research contributes to the understanding of how EWCO, a sustainable and eco-friendly plasticizer, affects the mechanical and thermal properties of PLA composites.