INVESTIGATION OF MECHANICAL & DYNAMIC PROPERTIES OF CHEMICALLY AND MICROWAVE TREATED CALOTROPIS GIGANTEA REINFORCED NELUMBO NUCIFERA FILLED HYBRID POLYMER COMPOSITE.

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Submitted

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CERTIFICATE

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ABSTRACT

In recent times, there has been an increasing inclination towards the use of natural fibers as reinforcements in polymer composites owing to their environmentally sustainable and renewable characteristics. In this context, the present study used Calotropis Gigantea fiber, which has minuscule significance in vegetation value, and waste Nelumbo Nucifera filler for the production of polymer composites. This work aims to examine the mechanical and dynamic properties of a hybrid composite material consisting of a Chemically and Microwave Treated Calotropis Gigantea (CMTCG) fiber combined with Nelumbo nucifera (NN) infills. The assessment of the mechanical properties of several combinations of CMTCG with NN infills was conducted utilizing established testing methodologies, including tensile, flexural, impact, and Dynamic Mechanical Analysis (DMA) to assess the viscoelastic nature of the composites. In addition to this, a Cole-Cole curve is plotted by utilizing the findings of the DMA to analyze the effect of particle impregnation and the anticipation of the heterogeneity of the composite material at different loadings of fillers. The investigation of dynamic mechanical characteristics, such as storage modulus, loss modulus, and damping factor, involves the analysis of how composites react to dynamic loads across various loading circumstances. The current investigation revealed that a fiber loading of 10 wt% represented the optimal threshold since any loading above this value resulted in a noticeable decline in all characteristics. Moreover, with the inclusion of greater weight percentages of the NN filler into the CMTCG epoxy system, it seems that the epoxy resin is inadequate in terms of effectively diffusing throughout the CMTCG fiber Mat and NN filler. Consequently, this leads to a loss in mechanical characteristics.

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