EXPERIMENTAL INVESTIGATION AND ANALYSIS OF MECHANICAL PROPERTIES OF POLYVINYL ESTER/GLASS FIBER COMPOSITE WITH ALUMINA ($\text{Al}_2\text{O}_3$), MOLYBDENUM DISULFIDE (MoS$_2$) AND TITANIUM OXIDE (TiO$_2$) FILLERS

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ABSTRACT

In the present research work, the experimental analysis was conducted on Polyvinyl ester/Glass Fiber composite with Alumina ($\text{Al}_2\text{O}_3$), Molybdenum disulfide (MoS$_2$) and Titanium oxide (TiO$_2$) fillers. Polymer composites offer numerous advantages for the high strength to weight ratio due to low density, high modulus, and better stiffness. Low strength and ductility of Polyesters, vinyl-esters, and epoxy cannot be applied for technical applications, hence reinforced by fiber and fillers to form composite matrices. The increase in % of filler has enhanced the ultimate strength monotonously except for 12.5% of TiO$_2$ filler in the polyvinyl ester/GF composites. The addition of Al$_2$O$_3$ filler has better Young’s modulus compared to other fillers and maximum Young’s modulus was observed for 12.5% Al$_2$O$_3$ and there is a drastic increase in Young’s modulus to almost 40% compared with 7.5% Al$_2$O$_3$ polyvinyl ester composite. Flexural strength of particulate filled polyvinyl ester composite composites improved due to strong interfacial adhesion and the surface roughness act as mechanical interlocking. It is also evident that the addition of MoS$_2$ filler is more beneficial than that of Al$_2$O$_3$ filler in improving the flexural strength and modulus of polyvinyl ester/GF composite. The SEM study was conducted to infer the results obtained for the tensile and flexural tests conducted for the polyvinyl ester/GF composite.

KEYWORDS: Polyvinyl ester Polymer, Glass Fibre with Filler Composites, Al2O3 Filler, MoS2 Filler & TiO2 Filler

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