



# An extensive analysis of mechanical, thermal and physical properties of jute fiber composites with different fiber orientations

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## ABSTRACT

The study is aimed to find the effect of orientation of the woven jute fiber on the composites with epoxy matrix on the mechanical properties, thermal properties with different orientations (0°, 15°, 30°, 45°, 60° & 75°) of jute fiber. The mechanical properties such as tensile strength, flexural strength, and impact strength of the prepared composites are obtained with ASTM standard specimens. The composite prepared with 30° orientation fiber has shown better properties compared to the other orientation directions. Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA). The work has been carried out to predict the thermal properties of the prepared jute fiber composite specimens. DSC analysis revealed volatilization of the molecules induced the endothermal reaction, and the charring development caused the exothermal reaction. TGA curve peaks showed the removal of hemicellulose, decomposition of cellulose and lignin.

## 1. Introduction

Composite materials are comprised of one or more physically or chemically dissimilar elements on macro/micro/nano-scale irregular phases embedded in a continuous phase to produce a composite. The reinforcement is generally an irregular phase, and it is usually harder and tougher than the matrix material [1]. Three matrix materials are generally used, and they can be polymer, metal, and ceramic. In a polymer matrix composite (PMC), a polymer is a matrix material. In PMC, the discontinuous strengthening phase can

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