



## RESEARCH ARTICLE

# Long-term environmental bending behaviors and service LIFE prediction of KEVLAR fiber mat epoxy composite

Muniraju Muralidharan ✉, Thottyeapalayam Palanisamy Sathishkumar ✉, Jesus de-Prado-Gil, Rebeca Martínez-García

First published: 25 February 2022 | <https://doi.org/10.1002/pc.26549>

[Read the full text >](#)



PDF



TOOLS



SHARE

## Abstract

Service life prediction of lightweight fiber reinforced polymer composites is essential for activating the recycling process in the future. The present work investigates the amount of material diffusion, long-term flexural performance, and prediction of service life for Kevlar fiber mat reinforced Epoxy Composites (KEC). Hand layup technique and compression molding were used for manufacturing the composites and they were submerged in water at 20, 40, and 60 °C temperatures for different time durations like 50, 150, and 300 days. As per the ASTM D 790 standard, the three-point flexural test was conducted on unaged and aged composites. Fick's law was used to calculate the diffusivity, and the Arrhenius principle was used to calculate the service life and activation energy. Experimental outcomes portrayed that the maximum water absorption for KEC occurred at 60 °C for all immersion periods. Moisture absorption was purely depending on the temperature and duration of the aged composite. Dry KEC showed higher flexural strength than aged composite. The higher flexural strength retention of 58.56% with the maximum service life of 100 years was found for KEC at 40°C. It shows the service life of the kevlar fiber reinforced epoxy composites.